THE MANAGEMENT OF INFORMATION INSIDE THE GENERAL SUPPORT BASE CONCEPT OF THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

A Study Project presented to the Faculty of Military Science of the University of Stellenbosch in partial fulfilment of the requirements for the degree of Masters in Organisation and Resource Management

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DECLARATION

I, Christoffel Bester declare that this study project is my own original work and that all sources have been accurately reported and acknowledged, and that this document has not previously in its entirety or in part been submitted at any university in order to obtain any academic qualification.

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Date

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ABSTRACT

Managing any government institution has become increasingly complicated as the requirements for accountability; streamlined operations and greater flexibility have multiplied. As effective and efficient management becomes more complex and the demands of constant change are more insistent, consequently the role of information as an organisational resource assumes greater importance for management on all levels inside the organisation. Management relies heavily on information to thrive. The value of information is derived from the actions that managers take as a result of using information.

Information management consumes a large portion of any organisations finite resources and it would be to the benefit of the South African National Defence Force to achieve goal congruence between the information management objectives and the organisational objectives. If information is to be viewed as a resource of comparable importance to staff assets, and finance it must be procured and managed as purposefully as any other resource. Information can be seen as a strategic resource for any organisation and must be managed accordingly. The Public Service Act, Act 103 of 1994, which classifies information as a strategic resource for the public sector, confirms this. The formal information management strategy of the Department of Defence must therefore enable the information systems of the South African National Defence Force to support the military and business objectives of the Department of Defence. This strategy specifies how an organisation matches its scares resources and capabilities with the opportunities in the environment to accomplish its objectives.

The structure of the South African National Defence Force, before transformation, was centralised and structured into vertical silos. The current information systems in use are therefore functionally orientated supporting the centralised structure (vertical silos). Transformation restructured the South African National Defence Force into a more integrated forces concept (general support base concept), suggesting emphasis on co-operation, joint planning and joint operations. The management of information must move away from the islands and silos towards an integrated and shared environment that enables the integration of information amongst the integrated forces of the organisation. This joint engagement strategy places certain requirements on the resource information to enable it to support the military and business strategy of the Department of Defence.

The South African National Defence Force is moving unavoidably closer to an accountability framework based on transparency and compliance with legislation and regulations. An

integral part of this framework is the requirements to provide clear and unambiguous evidence of how and why decisions are made. If managers and commanders are going to be more accountable, information must be available to assist them in decision-making and control. With the introduction of the Public Finance Management Act and the Promotion of Access to Information Act, the ability to adhere to the requirements of accountability and responsibility has become a necessity.

Relevant and timely information for decision-making and control purposes therefore must be provided to managers and commanders to assist them in decision-making and control. In its present state the available architecture of the information systems of the South African National Defence Force is inadequate to provide the required information for decision-making and control purposes. The information management practices including the information systems therefore must be improved to ensure adherence to the requirements of accountability and responsibility.

This study is directed towards the improvement of the quality of information provided by the information systems of the Department of Defence to assist commanders and managers in decision-making and the provision of information for control purposes inside the general support base concept of the SANDF. This improvement can only be achieved by changing budget priorities to ensure a higher priority on information technology across the organisation. Failure to improve the information management practices will result in the ineffective execution of the defence strategies.

OPSOMMING

Die bestuur van enige regeringsinstansie raak toenemend kompleks namate die eise van aanspreeklikheid, operasies en groter buigsaamheid meer word. Soos doeltreffende en doelmatige bestuur meer gekompliseerd en die vereistes vir voortdurende verandering meer veeleisend raak, word die rol van informasie as 'n organisasie hulpbron al hoe belangriker vir bestuurders op alle vlakke binne die organisasie. Bestuurders steun sterk op informasie om suksesvol te wees en die waarde van informasie word dan juis bepaal deur die aksies wat bestuurders neem deur informasie te gebruik.

Informasiebestuur neem 'n groot deel van enige organisasie se beperkte hulpbronne in beslag en dit sal voordelig wees vir die Suid-Afrikaanse Nasionale Weermag om doelwitooreenstemming te bewerkstellig tussen informasiebestuurdoelwitte en organisasiedoelwitte. Indien informasie gesien word as 'n hulpbron van betreklike belang vir personeel, bates en finansies moet dit net so doelgerig as enige ander hulpbron bekom en bestuur word. Informasie is 'n strategiese hulpbron vir enige organisasie en moet dienooreenkomstig bestuur word. Dit word bevestig deur die Staatsdienswet, Wet 103 van 1994, waarin informasie as 'n strategiese hulpbron in die staatsdiens geklassifiseer word. Die formele informasie bestuurstrategie van die Departement van Verdediging moet dus die informasiestelsels van die Suid-Afrikaanse Nasionale Weermag in staat stel om die militêre en besigheidstrategie van die Departement van Verdediging te ondersteun. Hierdie strategie spesifiseer hoe 'n organisasie sy skaars hulpbronne en vermoëns verbind aan geleenthede in sy omgewing om sy doelwitte te bereik.

Voor transformasie was die struktuur van die Suid-Afrikaanse Nasionale Weermag gesentraliseerd en in vertikale silo's gestruktureer. Die informasiestelsels huidig in gebruik is derhalwe funksioneel georiënteer en ondersteun die sentrale struktuur (vertikale silo's). Danksy transformasie is die Suid-Afrikaanse Nasionale Weermag hergestruktureerd in 'n meer geïntegreerde magtekonsep ("general support base concept") met die fokus op samewerking, gesamentlike operasies en gesamentlike beplanning. Die bestuur van informasie moet wegbeweeg van die eilande en silo's-benadering na 'n meer geïntegreerde en gedeelde omgewing wat die integrasie van informasie tussen die geïntegreerde magte van die organisasie moontlik maak. Hierdie gesamentlike strategie stel sekere vereistes aan die hulpbroninformasie om die ondersteuning van die militêre en besigheidstrategie van die Departement van Verdediging moontlik te maak.

Die Suid-Afrikaanse Nasionale Weermag beweeg onvermydelik nader aan ‘n aanspreeklikheidsraamwerk wat gebaseer is op deursigtigheid en die nakoming van wetgewing en regulasies. ‘n Integrale deel van hierdie raamwerk is die vereiste om duidelike en betroubare bewyse oor besluitneming te verskaf. Indien bestuurders en bevelvoerders meer aanspreeklik gehou gaan word, moet informasie beskikbaar wees om hulle by te staan in besluitneming en beheer. Met die implementering van die Wet op die Bestuur van Openbare Finansies ("The Public Finance Management Act") en die Wet op Openbaarmaking van Informasie ("Promotion of Access to Information Act") het die vermoë van organisasies om te voldoen aan die vereistes van aanspreeklikheid en verantwoordelikheid ‘n noodsaaklikheid geword.

Relevante en tydige informasie vir besluitneming en beheer moet dus voorsien word aan bestuurders en bevelvoerders om hulle by te staan in besluitneming en beheer. Die huidige stand van argitektuur van die informasiestelsels van die Suid-Afrikaanse Nasionale Weermag is onvoldoende om die vereiste informasie vir besluitneming en beheer te verskaf. Die praktyke vir die bestuur van informasie moet dus verbeter word om uitvoering te gee aan die vereistes van aanspreekilikheid en verantwoordelikheid.

Hierdie studie is gerig op die verbetering van die gehalte van informasie wat verskaf word deur die informasiestelsels van die Departement van Verdediging om bevelvoerders en bestuurders by te staan in besluitneming, asook die verskaffing van informasie vir beheer doeleindes binne die "general support base"-konsep van die SANW. Hierdie verbetering kan slegs bereik word deur begrotingsprioriteite te verander om te verseker dat ‘n hoër begrotingsprioriteit op informasietegnologie geplaas word reg deur die organisasie. Die onvermoë om die informasiebestuurspraktyke te verbeter sal die bereiking van die verdedigingstrategieë nadelig beïnvloed.

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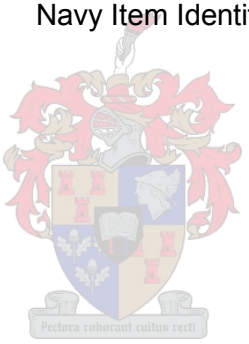
LIST OF ABBREVIATIONS

AII	Army Item Identification
ARS	Action Request System
BAS	Business Advice Service
BI	Business Intelligence
CALMIS	Computer Aided Logistics Management Information System
CEO	Chief Executive Officer
CI	Counter Intelligence
CII	Corporate Item Identification System
CIO	Chief Information Officer
CIMA	Chartered Institute of Management Accountants
C LOG	Chief of Logistics
CMI	Command Management Information
COE	Common Operating Environment
COMM	Communication
COMM & S	Communication and Support
CORP	Corporate
COTS	Commercial of the Shelf
CRM	Customer Relationship Management
CSL	Chief Staff Logistics
DAP	Defence Application Portfolio
DCN	Defence Communications Network
DIC	Defence Information Capabilities
DII	Defence Information Infrastructure
DIMS	Depot Information Management Systems
DOD	Department of Defence
DW	Date Warehouse
EAP	Enterprise Architecture Planning
EIS	Executive Information Systems
ER	Equipment Register
ERP	Enterprise Resource Planning
FIN	Financial
FIMS	Financial Information Management System
FMS	Financial Management System
FRS	Facilities Register System

FSE	Force Structure Element
FSE’s	Force Structure Elements
GIGO	No-Garbage-In-Garbage-Out
GSB	General Support Base
GS4	General Staff 4
HR	Human Resources
IC	Information Centre
ICT	Information and Communication Technology
II	Item Identification
IMS	Information Management Services
INT	Intelligence
IRM	Information Resource Management
JCC	Job Card Sub-system
KBA	"Kontant Bestellingsadministrasie"
LIMS	Logistic Information Management System
LOG	Logistics
LOG EIS	Logistic Executive Information System
MED	Medical
MII	Medical Item Identification
MIS	Management Information Systems
MOM	Message Orientated Middleware
MP	Military Police
MS4	Medical Staff 4
NCB	National Codification Bureau
NCS	National Codification System
NEPAD	New Partnership for Africa's Development
NS4	Navy Staff 4
OAS	Order Administration System
OIS	Organisational Information System
OLCIMS	Online Cataloguing Information Management System
OPS	Operations
OSIS	Operational Support Information System
PERS	Personnel
PERSOL	"Personeel en Soldy" System
PFMA	Public Finance Management Act
SA	South African
SAAF	South African Air Force

SADF	South African Defence Force
SAMHS	South African Military Health Services
SAMHS EIS	SAMHS Executive Information System
SANDF	South African National Defence Force
SAP	Systems Applications Products in Data Processing
SD	Strategic Direction
SDI	Support Defence Information
SICTP	Strategic Information and Communication Technology Plan
SISP	Strategic Information Systems Plan
SITA	State Information Technology Agency
SLA	Service Level Agreement
SMCS	Structure Management Control System
SWIFTHR	Swift Human Resources
UIMS	Unit Inventory Management System
VII	Navy Item Identification



CHAPTER 1

INTRODUCTION TO THE RESEARCH

1.1 BACKGROUND

As effective and efficient management becomes more complex and the demands of constant change become more insistent, the role of information as an organisational resource assumes greater importance for management at all levels. Information is central to operations, the provision of services, achieving value for money, competitiveness and to the working of democracy. It is central as a resource, as a service, as a window on the authority and as a medium for influence and for enabling. It is central to day-to-day operations, to management, to strategy and to politics (The Local Government Management Board, 1995: 5).

Information tends to be insufficiently available and as a result its role and value to organisations is vague. Information management and information technology is inseparable. Managers believe that the effective management of information requires more time and attention than they feel they have. However, these difficulties do not deter many organisations' intent on profiting from the information revolution. Managers are overflown with offers of advice and assistance from local specialists, academics, suppliers of information hardware and software and from consultants on how to manage their information and information technology systems. This should not be ignored as information improves the user's knowledge and understanding of the topic to which the information relates and it adds value to the product and services and could assist in planning.

Information describes the organisation in terms of what has happened in the past, what is happening now, and what is likely to happen in the future. This information is usually made available in the form of reports, which is again used by managers to make informed management decisions to solve problems (Mcleod, 1990: 300-302).

The information sheds light on problems rather than specific decisions, and it is left to the discretion of the manager to determine how the information is to be used. A business obtains inputs (capital, raw materials, labour and information) in the form of resources from the environment (Cronje, Du Toit & Motlatla, 2000: 35). These inputs from the community are then processed and made available to the environment as outputs in the form of products and services. Management is the process in which the organisation’s capital, raw materials,

labours and information resources are deployed to attain specific objectives. Control in an organisation should focus on the effective management of these resources, as well as the realisation of objectives (Smit & De J Cronje, 1992: 433).

If in the modern world information is to be viewed as a resource of comparable importance to staff, assets and finance, it must be procured and managed as purposefully as any other resource. In the private sector, the belief is that the three most significant aspects influencing competitiveness in manufacturing are logistics, information systems and manufacturing. In many organisations information systems is listed as their top priority (Trommer, 1996: 1-3).

Too much too little information will be counter productive. A number of different types of information must be produced by the information systems of any organisation to ensure that the information requirements are addressed in a satisfactory manner. This includes operational information, information for decision-making, performance information and community information.

Information systems are not seen as simply a tool to record transactions and process data, but as a weapon, which can change the structure and strategy of an organisation (Sherwood-Smith & White, 1998: 65). The information supplied by the system assists in the evaluation of the organisation and guides the changes necessary to improve the effectiveness and efficiency of the organisation (Lambert & Stock, 1999, 536-538).

Designing and implementing information systems to support the strategy of the organisation is critical. These systems will include logistical information systems, financial information systems, human resource information systems, operational information systems and management information systems. Without top management support, the needed resources for an effective information system will be unavailable and the information system will be unsuccessful in meeting strategic objectives (Bardi & Raghunathan, 1994: 2-5).

Information management also plays a critical part in managing a large national organisation like the South African National Defence Force (SANDF). The assurance of quality command and management information is one of the strategic objectives of the SANDF (Republic of South Africa, 2002: 7). In this regard, the SANDF faces huge challenges in managing information as one of its biggest and most valuable assets.

1.2 MOTIVATION FOR THE INVESTIGATION

An integrated information system is required to support the SANDF (Cumming, 2001). The integrated system must be up to date, totally integrated and flexible enough to adapt to technology changes. Interfaces between the different functional systems (human resource, finance, logistics and operations) must be ensured so that a total integrated Department of Defence (DOD) system exist (Snyman, 1998: 3). There are many debates regarding the future system. Should a new system be developed? Could a Commercial off the Shelf (COTS) programme be bought and adapted? Could existing systems be utilised in the DOD?

Over the years, organisations allowed their information systems to develop in relation to specific business tasks and this development has led to a lack of integration and consequently difficulties in providing corporate information. In modern organisations, the formulation of an information systems strategy is seen as fundamental where business tasks are linked both internally and via networks. The use of modern software can bridge the gap of different systems running on different hardware platforms but this is, however, not a long-term solution and uniformity in hardware platforms is essential (Bentley, 1998: 4).

Computer and communications technology is developing faster than most organisations can keep up with. It is reasonable to expect organisations to be lagging behind in this technology, not because they do not recognise the opportunities, but because the organisational and financial implications of change prevent rapid implementation of new ideas (Bentley, 1998: 4). This is especially evident in certain public sector organisations like the SANDF that suffered enormous budget cuts over the last five years and this has adversely influenced the level of technology in the SANDF. Resistance to change is another fact to be recognised and it also had a negative effect on the technology used in the SANDF (Norrie, 2001).

The structures of the SANDF before transformation were centralised and power orientated. The SANDF was structured in independent vertical silos consisting of the different Services namely the South African (SA) Army, SA Navy, South African Air Force (SAAF) and Surgeon General (Cumming, 2001). The independence was further strengthened when the respective services designed their own logistical functional systems to provide in their specific needs. For example the SA Army use the Computer Aided Logistical Management Information System (CALMIS) and the SA Navy and SAAF use the Operational Support Information System (OSIS). The other functional systems were shared between the different Services.

The political, social and economic changes in South Africa urged the DOD to undergo fundamental transformation in order to adapt to the new requirements of a democratic South Africa. An essential aspect in enabling the DOD to achieve its transformational objectives is organisational redesign. The specific aim of the redesign effort is to improve the DOD efficiency in order to sustain and effectively deliver required outputs within the available budget and policy constraints (Department of Defence, 1998: 1-2).

As part of the transformation and redesign of the DOD it become apparent that a base structure must be formulated to ensure that the core business of units will not be hampered or impaired by the support function. This support structure has given rise to the General Support Base (GSB) concept aimed at ensuring common support to all Force Structure Elements (FSE's) within its designated area (Department of Defence, 1998: 2). Transformation changed the logistical picture of the SANDF drastically.

The responsibility of determining logistic policy and procedure were taken away from the Services, suggesting a flatter organisation structure. Under the GSB concept, it is the responsibility of the Chief of Logistics (C LOG) to manage systems, determine and implement policy and procedures. The Services will now only be responsible for their core business. The functions of the support bases inside the respective Services are accounting, warehousing, distribution, disposal administration and codification. The Services remain responsible for system management and product management (Craig, 2001).

These newly established support bases are responsible for the general services provided to the different FSE's inside their area of responsibility (Craig, 2001) as well as the logistic services. Regardless of the respective Services they belong to these services must be provided to the different FSE's. The different FSE's inside a support base do not depend on the respective Services the support base belongs to, for example, in some circumstances a SA Army support base must provide services to SAAF, SA Navy, SA Army and South African Military Health Services (SAMHS) FSE's. These service requirements place pressure on the Information Systems of the SANDF.

The systems currently used, for example OSIS and CALMIS, are not easily compatible with each other because these systems use different software applications and the processes of the systems also differ (Cumming, 2001). The result is that vital summarised management information for planning and control can not be provided effectively by the different information systems. The practical and fundamental importance of the study therefore, is to

attempt to evaluate whether or not the current information management practices are able to support the effective and efficient functioning of the SANDF inside the GSB concept.

1.3 STATEMENT OF PROBLEM AND ITS PRACTICAL RELEVANCE

It is a well-known fact that the unlimited needs of society exceed the limited economical factors (resources) necessary to satisfy these needs. Organisations must therefore plan the allocation of their available resources carefully in order to achieve its various objectives. Until recently, most organisations regarded information and information systems as a resource that was necessary but not strategically significant. Information management was treated like any other collection of overheads and the information systems were allowed to evolve rather than being planned (Lewis & Harris, 2001: 173-174)

Because information management and information systems consume a huge portion of any organisation's finite recourses, it would be to the benefit of the organisation, such as the SANDF, to achieve goal congruence between the information management objectives and the organisational objectives. This congruence can be achieved with a formal information management strategy, which specifies how an organisation matches its scares resources and own capabilities with the opportunities in the environment to accomplish its objectives (Horngren, Datar & Foster, 2000: 447).

The challenge facing the DOD is to deploy its scarce resources and economically utilise its capabilities to accomplish its objectives as cost effectively as possible. Managers on different levels therefore require consistent, accurate, timely, economically feasible and relevant information provided by the information systems of the DOD. Without the effective management of this information, managers in the DOD and more specific SANDF will find it difficult to deploy its scarce resources and its capabilities to accomplish its objectives as cost effectively as possible.

The SANDF is an exceptional and unique organisation with certain unique management practices. Due to fundamental differences between military and civilian spheres, the SANDF cannot be compared directly to the civilian sphere but basic management practices remain important and managers on all levels in the organisation must follow it.

The newly established support bases (after transformation in 1999) are responsible for providing general services as well as logistics services to the different FSE's inside their area of responsibility (Craig, 2001). These services must be provided to the different FSE's

regardless of the respective Services they belong to and this places pressure on the information systems of the SANDF. For the GSB concept to be effective, it requires consistent, accurate, timely, economically feasible and relevant information.

Information technology encompasses all forms of technology used to create, store, exchange and use information in its various forms. The information technology infrastructure of an organisation can be defined as all the hardware and software installed to form the platform on which information systems of organisations must execute (Needham, 2002: 68). It is a convenient term for including both telephony and computer technology in the same phrase. It is consequently imperative that the SANDF not only determine the information requirements but also the appropriate information technology infrastructure to satisfy the information requirements.

This study will therefore attempt to identify and evaluate effective and efficient information management practices to ensure the proficient functioning of the GSB concept within the SANDF. The information requirements of the SANDF inside the GSB concept will also be determined and the extent to which limited resources must be allocated towards information management in providing an appropriate information technology infrastructure to accomplish the objectives of the SANDF.

The relevance of the findings will be highlighted in the course of the research and it is expected that similar problems and solutions will be found as in most civilian organisations.

1.4 THE INVESTIGATION

Research refer to the systematic, focussed (Ghauri, Gronhaug & Kristianslund, 1995: 83) and orderly collection of data (primary and secondary) for obtaining information from it, to solve a research problem. Primary data is original data collected specific for the research problem at hand by using for example interviews, observations and questionnaires. Secondary data is information collected by others for purposes that can be different from the current research problem, for example academic journals, textbooks and other published material (Ghauri, Gronhaug & Kristianslund, 1995: 54-58).

A clear distinction must be made between quantitative and qualitative research. Quantitative research relies on developing numbers that can be used to describe phenomena under study and such data can subsequently be analysed using the techniques of statistical analysis. Miles and Huberman (1994: 8-14) describe qualitative research as usually based on words

rather than numbers and Cornford & Smithson (1996: 40-41) defined it as research that eschew metrication and seek other means of capturing and analysing data. Qualitative research is a mixture of the rational, explorative and intuitive and is suitable for studying organisations, groups within organisations and individuals (Ghauri, Gronhaug & Kristianslund, 1995: 84).

The investigation for this study will be done through a very broad descriptive survey method (qualitative research) with the emphasis on describing. The descriptive survey method deals with a situation that demands the technique of observation as the principle means of collecting data. Descriptive or factual knowledge includes data, facts, empirical generalisations, narratives and stories and provides a truthful description of phenomena in the world. Descriptive statements make claims about how things are and what the actual state of affairs or fact of the matter is (Mouton, 1998: 102).

The research for this study will be done primarily through a study of literature (secondary data) that will entail textbooks, journals, published articles, papers delivered at conferences, and a wide array of sources found on websites. This will be supplemented with interviews with personnel employed (DOD levels 2 and level 3 / 4) by the SANDF. The interviews (primary data) will focus on personnel (middle and top management) involved in the management of information inside the GSB concept. As knowledge is buried deep within the minds, attitudes, feelings and reactions of people structured and semi-structured interviews will be used for observing the explicit (formal) and tacit (informal) knowledge of personnel (Nonaka, 1991: 97-99). The study will attempt to articulate the knowledge gained from the interviews into usable information. The interview will further offer the researcher the opportunity to explore topics in depth and to gain an appreciation of the organisational context within which the topic is addressed. Any negative attitudes that may exist towards the interviewer and personal perceptions, attitudes and beliefs of the interviewee that could affect the research results could be addressed and clarified (Leedy, 1997: 191).

The researcher accepts the limitations that a lack of empirical data on current information management practices inside the GSB concept of the SANDF and attitudes amongst managers will have on this study. Instead of trying to expose the present status of such knowledge, it is rather directed at formulating a body of knowledge that should exist within the organisation. The research findings, although not conclusive because of the study's exploratory nature, can play an important role to expand the available knowledge on information management practices inside the GSB concept and to put the existing knowledge

into proper perspective. This leaves room for later studies to establish the congruence between current and ideal levels of knowledge and attitudes.

1.5 EXPECTED RESULTS

Since the proposed study is directed towards the improvement of the quality of information management practices and information provided by the information systems of the DOD, it will attempt to formulate and motivate the need for summarised management information without compromising the current organisational structure. Proposals for the improvement and even replacement of current systems will also be made to ensure that the information provided by the different systems will eventually assists in the effective and efficient functioning of the GSB concept.

It is furthermore expected that this study would provide guidelines for the effective and efficient management of information within the SANDF. Since the research is of relevance to the SANDF, the results of this study will be formulated in such a way that it could be incorporated into existing information management programmes to improve the management of information in the DOD and more specific the SANDF. This would contribute to a more effective and efficient defence force.

1.6 STRUCTURE OF THE STUDY

The task is to determine the type of information that is required at the different levels in the SANDF under the new GSB concept. A fine balance needs to be calculated and formulated for the specific context of the SANDF. Once the information requirements have been articulated for the SANDF the current information systems in use must be critically evaluated to determine their effectiveness in providing the required information and expected control to ensure that the GSB concept functions effectively.

The purpose of this research project is to translate the defined information management practices of the DOD into information management theory that provides a framework for the implementation of a more efficient information strategy for the SANDF within the GSB concept. Hence, the proposed study is about information management in the DOD and how information can contribute to the effective and efficient management of the organisation as a whole.

The study plan will therefore follow the sequence as outlined below:

- Chapter 2 provides a fundamental theoretical synopsis of the concepts associated with information management.

- Chapter 3 provides a scientific approach to information management inside the SANDF and in conjunction with Chapter 2 serves as the theoretical grounding of the study project.

- Chapter 4 examines the information management practices that are currently used in the SANDF. A brief overview will be provided of the pre-transformation structure and the current structure of the SANDF.

- Chapter 5 provides an overview of proposals to improve information management inside the GSB concept of the SANDF. These proposed improvements should not be regarded as the final product, but as the first step in providing the SANDF with improved information management practices that should be revisited and refined by means of further empirical research.

- The study is concluded in Chapter 6 with a summary, conclusions and recommendations. It is suggested that the recommendations be implemented in parallel with ongoing empirical research.

1.7 PROMINENT TERMINOLOGY AND DEFINITIONS

Adaptive Architecture

An adaptive architecture enables rapid change in business and administrative processes and the applications that enable them. This architecture approach makes specific provision for potential changes in business requirements and processes, with the consequent changes in application systems, and enabling the new demands on Information and Communication Technology (ICT) infrastructure (Needham, 2002: 65).

Architecture

Architecture is the knowledge of the design of something. It can be defined as the structure of components, their interrelationships and the principles and guidelines of governing their design and evolution over time.

Availability

Availability is defined by the systems category for both routine and priority operations. It refers to the probability that system functional capabilities are ready for use by a user at any time, including operations, repair, and administration and logistic time.

Common Operating Environment

Common Operating Environment (COE) is the union between business information technology and the operations information technology environment. It is further described as an asset of predetermined common enabling components used and shared by all DOD service elements (Needham, 2002: 65).

Component

In programming and engineering disciplines, a component is an identifiable part of a larger program or construction. Usually, a component provides a particular function or group of related functions. Components are the simple building blocks that can be assembled into complex systems (Needham, 2000: 57).

Connectivity

Network connectivity provides connected devices, such as computers, across a network line. It refers to the ability to send and receive information between various locations, devices and business services.

Common Operating Environment Desktop

In support of the multi-role approach, this concept exemplifies simplicity and uniformity to access and process information. The COE desktop is pre-configured with a set of common enabling components and unique mission specific components (Needham, 2002: 66).

Data

Data is a gathered body of facts that has not been processed in some way. When information is entered into and stored in a computer, it is translated into a form that is more convenient to move or process. After processing, output data can be again be perceived as information.

Defence Communication Network

The unified defence communication network will reduce duplication and embrace opportunities for joint use of network and communication assets in the DOD. The Defence Communication Network (DCN) provides a common vision and integrated approach to future

developments of communication networks in pursuit of an integrated and dynamic defence network (Needham, 2002:66).

Defence Information Infrastructure

A comprehensive set of components that is utilised to capture, store, communicate, process and present information in the DOD in every location of the business or battle space. The Defence Information Infrastructure (DII) is thus the enabling system that supports the information through its life cycle in the DOD (Needham, 2002:66).

Distributed Environment

This type of environment refers to a network environment, or topology, in which decision making, file storage and other network functions are not centralised but instead are found through the network. This type of environment is typical for client-server applications and peer-to-peer architectures.

Distributed Systems

The deployment of DOD applications and systems across the entire enterprise environment is included by the term-distributed systems.

Dynamic Defence Information Infrastructure

Defence Information Infrastructure is segmented into a static and one or more deployable zones interconnected through clearly defined ports. The static zone serves the day-to-day business of the DOD, whilst one or more deployable zones support the joint force missions. Every zone comprises a communications network, one or more data centres and an information gathering and decision cluster (Needham, 2000: 58).

Hardware

Hardware is physical equipment that includes workstations (personal computers), servers, mainframe and peripheral equipment, which do not consist of programs.

Force Structure Element

Force structure elements can be defined as the headquarters, types of formations, support formations and units in the DOD that must be supported by the support base concept. The support bases according to the predetermined geographical regions of support are included in the definition (Department of Defence, 1998: 2-4).

Information

Information is data that have been processed in some way to be meaningful and useful to its recipient. It is a representation of facts, ideas, or opinions about objects, events and processes that exist on any medium or format.

Information Audit

The information audit is a management tool, which can assist an organisation to understand how its information assets are being put to use and how these can be more effectively harnessed to achieve optimum productivity and strategic advantage. It allows the resources devoted to information to be mapped, analysed, costed and rationalised.

Information and Communication Technology

It refers to hardware, software and communication infrastructure and it encompasses all forms of technology used to create, store, exchange, communicate and use information in its various forms. It further applies to the acquisition, processing, storage and dissemination of all types of information using computer technology and telecommunication systems (Needham, 2000: 59).

Information Assets

Information assets are the collected information, information systems and the infrastructure it is stored and processed on, which are used to support the mission and objectives of any organisation.

Information Management

The discipline directing and supporting effective and efficient managing of information in an organisation from planning and systems development to disposal and long-term preservation is called information management. It includes the application of an information policy in order to meet information objectives within the overall constraints of available resources.

Information Resource Management

Information Resource Management (IRM) is the planning, organising and controlling of data resources consistent with the overall goals and objectives of an organisation (Ward & Griffiths, 1999: 375).

Information System

An information system is a collection of people, procedures, a base of data and hardware and software that collects, processes, stores and communicates data in accordance with

defined procedures, whether automated or manual. The data is used for transactional processing at operational level, to support managerial decision-making and fulfil the problem solving information needs of an organisation (Adeoti-Adekeye, 1997: 321).

Information Technology

It as a term that encompasses all forms of technology used to create, store, exchange and use information in its various forms (business data, voice, conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived). It is a convenient term for including both telephony and computer technology.

Infrastructure

It is all the hardware and software installed used to form the platform on which business systems must execute.

Integration

Integration is the result of an effort that joins two or more similar products such as individual system elements, components, modules, processes, databases, or other entities, and produces a new functional product, as a replacement for the two or more similar but less capable entities (products), in a framework or architecture in a seamless manner.

Interface

Interface can be defined as the connection and interaction between hardware, software and the user.

Interoperability

This is the ability of two or more systems or components to exchange and use information. The ability of systems to provide and receive services from other systems and use the interchanged services to enable them to operate effectively together is included in the definition. It is also a measure of the ability of computers of different types to participate in the same distributed system (Needham, 2002: 68).

Knowledge

Knowledge has two basic definitions of interest. The first pertains to a defined body of information referred to as explicit knowledge (formal knowledge), which can be articulated in language and transmitted among individuals in the form of facts, opinions, ideas, theories, principles and models.

The second definition refers to the tacit knowledge (informal knowledge) of a person's state of being with respect to a body of information which includes experience, personal belief, perspective, values, awareness, familiarity and understanding. Tacit knowledge is highly personal and hard to formalise and communicate.

Knowledge Management

Knowledge management describes actions by an organisation to consciously and comprehensively gathers, organises, shares and analyses its knowledge in terms of resources, documents and people skills. It is a discipline promoting an integrated approach to identify, manage and share all organisational information to generate value from the intellectual and knowledge based assets.

Life Cycle

This refers to the period that starts when a system is established and ends when the system is no longer available for use.

Middleware

Middleware comprise the components to create an integrated environment between the client-server and server-server environments to improve the overall usability of the distributed infrastructure to the user. It is situated between the applications and network communication mechanisms and it creates uniform mechanisms for application integration independent of network and platform technologies (Needham, 2000: 61).

Management Information Systems

Management Information Systems (MIS) are integrated computer-based systems that make information about business operations available to support operations, management and decision-making functions on all organisational levels and in functional areas with similar needs in an organisation (Mcleod, 1990: 10). The MIS may consist of a number of information systems, which reflect the separate functions of the organisation. The sharing of common data and the integration of these functional systems are characteristics of a MIS.

Management of Information

It is an element of every task or function that has to do with treating the information used or produced in the course of performing the job duties as a strategic resource and ensure that it is in line with legal and policy requirements.

Platform

It is the foundation technology of a computer system, which includes a combination of computer hardware and operating system software. The operating system software is deployed on a platform. Broadly, it is defined as the combination of an operating system and a processor to form a system on which application programs can run.

Secure Port

It is a comprehensive, secure and intelligent component that facilitates connection between different zones (static, deployable and external) on both network and application level and functions as a natural “security” border between zones (Needham, 2000: 63).

Service Level Agreement

A Service Level Agreement (SLA) is an agreement that stipulates the expectations between the service provider and the customer and describes the products or services to be delivered. It is the single point of contact for end-user problems and the metrics, which monitors and approves the effectiveness of the process (Department of Defence, 1998: 3).

Silo

Inside an infrastructure context, a silo can be defined as the computing infrastructure elements with little or no interconnectivity and sharing of resources. Within systems context the functional systems (business application systems) do not integrate and interoperate or share data with other functional systems, it exists in isolation.

Support Base

The core business of a support base is to ensure clients, irrespective of which Service or Supporting Division they belong to, located within the support base predetermined designated area with a one stop base service. The support base must provide common support to all force structure elements within its area of responsibility. The support base is designed, structured and equipped to be a total service orientated self-accounting organisation based on extreme trust and co-operation. This organisation is guided by mutual dedicated service agreements that guarantee service excellence and zero defect, thereby allowing its designated force structure elements to concentrate on their unique core business (Department of Defence, 1998, 2-4).

Total Cost of Ownership

It can be defined as the entire life cycle cost of a product or system, including acquisition or development, maintenance and disposal. The typical costs associated with a personal

computer, for example, are the initial capital layout. However, supporting and managing the personal computer through its life cycle is a much higher figure. Total cost therefore includes hardware, software and upgrades as well as the cost of the in-house staff and/or consultants that provide training and technical support (Needham, 2000: 63).

User

A user is any person, organisation, or functional unit that uses the services of an information processing system. In a conceptual schema language, any person or application process may issue or receive commands and messages to or from an information system.

User Interface

It is commonly used to describe the front-of-screen appearance and functionality of an application or system, along with the mechanism for user-system interaction. Standards must be establish and enforce such conventions.

Web Architecture

The architecture focuses on seamless, platform-independent, intra-enterprise business communications and universal access to business information using web technologies (Needham, 2000:63).

CHAPTER 2

A FUNDAMENTAL THEORETICAL SYNOPSIS OF THE CONCEPTS ASSOCIATED WITH INFORMATION MANAGEMENT

2.1 INTRODUCTION

The concept of information in an organisational sense is more complex and difficult than the frequent use of this word would suggest. Every society is an information society and every organisation is an information organisation. Information is a basic resource like materials, money and personnel (Adeoti-Adekeye, 1997: 318). Essentially, therefore, information has become a critical resource, which is vital to the well being of individuals and organisations in the modern world.

Technology is changing the way in which information is captured, processed, stored, disseminated and used. Information like any other resource in an organisation should be managed to ensure its cost-effective use. Information is vital to good management and must rank in importance with the other organisational resources. The evolution of computer technology is expanding managers' desire to obtain computer assistance in solving more and more complex problems. Information systems are becoming of even greater interest in progressive and dynamic organisations (Adeoti-Adekeye, 1997: 319).

The development and use of information systems to improve the management of information inside organisations is a modern phenomenon concerned with the use of appropriate information that will lead to better planning, better decision-making and better organisational results. In discussing this topic, certain fundamental theoretical concepts need to be understood and appreciated. Some of these are the information system; the management information system; the development of information management; the information audit and the information maturity model. These theoretical aspects must be fully grasped before the importance of the management of information inside organisation can be appreciated. In this chapter, an attempt will be made to examine these concepts.

2.2 DEFINITION OF AN INFORMATION SYSTEM

Information systems are generally expected to provide not only a confrontation between the user and information, but the interaction required for relevant and timely decision-making. Their main purpose is to satisfy user’s information needs. Approaching information systems

in an organisational context shows that it is a sub system within an organisational system (Adeoti-Adekeye, 1997: 320-322).

Academics interested in how information works and information practitioners alike have defined information systems in various ways but with basic elements such as people, information technology and procedures, which enables the facilitation of the generation, use and transfer of information. The definition by Adeoti-Adekeye (1997: 321) is considered adequate: A collection of people, procedures, a base of data and (sometimes) hardware and software that collects, processes, stores and communicates data for transactional processing at operational level and information to support management decision making.

The DOD defines an information system (Needham, 2002: 68) as the organised collection, processing, transmission and dissemination of information, in accordance with defined procedures, whether automated or manual, fulfilling the problem solving and decision making information needs of an organisation. Certain deductions can be made from the above definitions:

- The definitions covers the what, how and why of information systems.
- An information system can be manual or computer based.
- Information systems have existed in organisations and always will.
- An information system is intended to support both the basic operations and information for decision-making and its management.
- A distinction is made between data for transaction processing purposes and information for decision-making purposes.
- The definition has provided the basic concepts underlying information systems, namely: people, management, information, systems and organisations. These concepts are interactively linked and are mutually inclusive.

The attributes indicated above can be considered as essential elements for developing an information system concept in an organisational context. Some of the most important computer based information systems are MIS, Logistical Information Management Systems (LIMS), Human Resource Systems and Financial Information Management Systems (FIMS).

2.3 DEVELOPMENT OF INFORMATION SYSTEMS

In mid-1960 large organisations had finally overcome the pains of implementing their first computers. It had been a difficult task since organisations had accumulated huge volumes of data over the years and considerable effort was needed to put the data into a form that was acceptable to computers. Nevertheless the computer was applied in the same way as the key driven and punched card machines. The tasks were well-defined and specific and were affecting primarily accounting departments. With the data processing systems, new operational application areas were now sought after and as in the past technology had been incapable of providing management information. It became clear that the computer could fill that gap (Mcleod, 1999: 295).

The first attempts to provide information to management turned out to be not an easy task. The biggest barriers were the managers. They knew nothing about the computer but they knew their jobs and they had developed their own approaches to problem solving. As a result, it was difficult for them to articulate exactly what they needed from the new information system. This situation was frustrating to the information specialist. Since they knew little about management, they did not know what questions to ask and systems were designed according to what the specialist thought management required (Mcleod, 1999: 296).

In many cases, the information specialist guessed wrong and the systems could not be used extensively. Over time, the managers learned about computers; they became aware of the underlying logic of the processes that they followed in solving problems and were eventually able to describe the information needs more clearly. The information specialist in turn learned the basics of management and how to work with managers in designing information systems. The information systems were redesigned and customised to fit the managers' needs, and management information eventually became established as a major computer application area (Mcleod, 1999: 296-298).

As organisations gained experience in implementing company wide information systems designs managers in certain areas began to tailor the system to fit their needs. Organisations have allowed their information systems to develop in relation to specific business tasks. These systems became so exclusive that it led to a lack of integration and consequently difficulties in providing corporate information for decision-making and control. In the SANDF, many of the information systems were tailored made for the needs of the respective Services. A good example is the logistical information systems of the SANDF.

The result today is the three main logistical systems that are in operation, namely CALMIS, OSIS SA Navy and OSIS SAAF.

It is only recently that the organisational information system that is intended for use by the executives and top management is established and implemented. The main reason for its late start is that executive actions and processes are not always well structured. It does not follow a set pattern and it is difficult to define how the computer can be used in this (Mcleod, 1999: 305). The computer has gradually made its way in the organisation and is eventually receiving attention in the executive suite. Executive Information Systems (EIS) is the term that has been coined to represent the systems that are designed specifically for executive use. Executive Information Systems are included under management information systems since the majority are 'higher level' versions of MIS.

There have been essentially three parallel threads of evolution enabling more extensive and better information systems to be developed (Ward & Griffiths, 1999: 13):

- Hardware could reduce cost and size, improve reliability and connect ability and further enable the system to be installed closer to the business problem;

- More comprehensive and flexible operating software and improved languages were developed enabling more to be produced, more quickly, with greater correctness and with less experience. This contributed to the extended availability of application packages.

- A methodology emerged to organise and carry out the multiplicity of tasks in more co-ordinated, better-synchronised and more efficient way to enable complex systems to be implemented and large projects to be managed successfully.

Computer and communications technology is developing faster than most organisations can keep up with. It is therefore reasonable to expect organisations to be lagging behind this technology, not because they do not recognise the opportunities, but for the reason that the organisational and financial implications of change prevent rapid implementation of new ideas (Bentley, 1998: 4). This is especially evident in the public sector. For example, the SANDF suffered enormous budget cuts over the last five years and this has adversely influenced the level of technology development and use in the SANDF. Resistance to change also had a negative effect on the technology use in the SANDF (Norrie, 2001).

The first difficulty presents itself in building an appropriate infrastructure: the decision is whether the system should be built for the way things are, or for the way that things are going to be. To build an infrastructure for the way things are going to be is difficult, but it should make provision for flexibility. This would be the correct approach on the long-term. There are three primary styles of building information systems infrastructure, namely the hierarchical style, the network style and the federal style. Each style has a particular appeal to certain types of organisations (Bentley, 1998: 6-7).

The SANDF prefers the hierarchical style because it is a centrally controlled approach. Data flows along channels that match the organisational structure and information is provided in the same way. Only at the higher levels, information is aggregated to produce management information. The information system must follow the organisational structure because it will also represent the decision structure of the organisation. In large hierarchical organisations, like the SANDF, decisions are taken far away from where the actual action takes place. Therefore, information has to flow to all decision-makers, rather than the decision solely being taken where the information is (Bentley, 1998: 8-9).

2.4 INFORMATION SYSTEMS AS A TOOL FOR MANAGEMENT INFORMATION

Information systems are not seen as simply a tool to record transactions and process data, but as a weapon, which can change the structure and strategy of an organisation (Sherwood-Smith & White, 1998: 65). A MIS is necessary in order to provide management with the knowledge to make strategic decisions regarding the organisation. The information supplied by the system assists in the evaluation of the organisation and guides the changes necessary to improve the effectiveness and efficiency of the organisation (Lambert & Stock, 1999: 536-538).

Designing and implementing information systems to support the strategy of the organisation is critical. These systems include logistical information systems, financial information systems, human resource information systems, operational information systems and MIS. Logistical information systems for example will include warehouse management, inventory and material management, procurement as well as various logistic planning tools (Anon (a), 2001: 2-3). The private sector believes that the three most significant aspects influencing competitiveness in manufacturing are logistics, information systems and manufacturing. Many organisations listed information systems as their top priority (Trommer, 1996: 1-3).

The information system employed by an organisation determines the efficiency and effectiveness of the organisation's activities. The ability to reduce operational costs and maximise service levels is affected by the information system. The objectives of service optimisation, cost optimisation, information integration and customer linking, motivate the implementation of an information system. The need for information to achieve these objectives results in the development of an information system for organisations for which top management support is an essential requirement. Without top management support, the needed resources for an effective system will be unavailable and the information systems will be ineffective in meeting strategic objectives (Bardi & Raghunathan, 1994: 2-5).

An integrated information system promotes concurrent and shared effort from factory to operational units in the following important ways in reducing lead times, down time and cost, and improves quality (Ichisar, Lapaque & Noel, 2000: 1-3).

2.5 DEFINITION OF A MANAGEMENT INFORMATION SYSTEM

Mcleod (1990: 10) defines a MIS as a computer-based system that makes information available to managers on all organisational levels and in functional areas with similar needs. The system is used in relation to a business operation; it refers to a group of elements that are integrated through the common purpose of achieving the same objectives. A system must have more than one element. Financial and logistical information is examples of such possible elements. All elements of a system must have some logical relationship as a system is designed to achieve one or more objective. All elements should work towards the system goal rather than towards their own separate goals. Mechanical systems are designed to achieve such co-ordinated operation. Systems comprised of humans, such as workers in an office are deficient in this build-in co-ordination. The manager of such human systems must motivate participants to co-ordinate activities so that those system objectives can be reached (Mcleod, 1990: 10-12).

According to the DOD information strategy, commanders and decision-makers at all levels must demonstrate leadership vision and decisiveness in every situation. Such attributes are attained through the Command and Control information system that provides accurate, relevant and timely information to all levels of command during force preparation, employment and support activities, and to every sphere in the business and military arenas (Republic of South Africa, 2002b: 8). In essence, the DOD information strategy is referring to a MIS.

The MIS support managers in particular functional areas by providing information for higher-level decision making. Efforts intended to support managers in functional areas include FIMS, LIMS and human-resource information management systems (Mcleod, 1990: 302-303).

2.6 THE DEVELOPMENT OF INFORMATION MANAGEMENT

Information management, also known as Business Intelligence (BI), is a critical tool for organisational success. Information management or BI traditionally revolved around the selection, acquisition, analysis, evaluation, organisation, storage, retrieval, presentation and dissemination of recorded knowledge in a variety of media forms. Although a single definition has not yet been agreed upon, knowledge management is the composite management of people, processes and information (Breen, Farragher, Mcquaid, Callanan, & Burke, 2002: 127).

Knowledge management can be defined as a business activity with two primary concerns. Firstly, treating the knowledge component of business activities as an explicit concern of the business reflected in strategy, policy and practice at all levels within the organisation (Santosus & Surmacz, 2003) and secondly, making a direct connection between the organisation's intellectual assets – both explicit and tacit knowledge – and positive business results. It includes the identifying and mapping of intellectual assets within the organisation to generate new knowledge for competitive advantage within the organisation, change management and making information available for decision-making and control purposes (Barclay &Murray, 2003).

Knowledge creation within organisations is a combination of enabling people with tacit knowledge to come together and get them to articulate their knowledge. The results of this process are added to the existing databases and information warehouses of organisations. This creates new tacit knowledge, which can be made explicit in a never-ending cycle. The role of data warehouses is to hold explicit knowledge, which assists people to create new tacit knowledge (Nonaka, 1991: 93-96).

In today's information driven economy, organisations derive the most value from intellectual rather than physical assets (Santosus & Surmacz, 2003). To obtain the most value from organisations intellectual assets, knowledge (tacit and explicit) must be shared and serve as the foundation for collaboration. The challenge inherent with tacit knowledge is how to recognise, generate, share and manage it. The challenge facing organisations is to convert

tacit knowledge into explicit knowledge. Nonaka (1991: 98-99) suggests four basic conversion processes for creating knowledge in organisations:

- Tacit-to-tacit (socialisation). It is where individuals acquire new knowledge from others for example through observation, imitation and practice. The knowledge cannot be leveraged by the organisation as a whole because it never becomes explicit.

- Tacit-to-explicit (externalisation). When an individual articulate his/her tacit knowledge of a specific topic it is converted into explicit knowledge, allowing it to be shared within an organisation.

- Explicit-to-explicit (combination). It entails the combining of different forms of explicit knowledge into a new whole for example knowledge in reports, documents and databases.

- Explicit-to-tacit (internalisation). New explicit knowledge is shared throughout an organisation and other employees use the explicit knowledge to extend or reframe their own tacit knowledge base.

The purpose of knowledge management is to enable people to build, use and share their knowledge by giving them the appropriate environment and incentives, including technical support. Organisations have become dependent on the flow of information and in doing so have created a knowledge economy. To be successful in a knowledge economy, organisations need to change and adapt (Breen, et al., 2002: 127).

It is vitally important for both the public and private sectors to accept that knowledge management has moved from an optional extra to a strategic necessity. The majority of organisations are looking for greater effectiveness because access to the right information frees up time for better utilisation by management. The use of information technology is now so widespread that it has become one of the most vital activities of organisations (Breen, et al., 2002: 128).

Information technology can support knowledge management, but is not the starting point of knowledge management programmes. Knowledge management decisions must be based on whom (people), what (knowledge) and why (business objectives). Programs must be

attached to business goals. Save the how (technology) for last (Santosus & Surmacz, 2003). Knowledge is the result of information and people brought together by technology.

Organisations have made headway in improving efficiency as they implemented operational systems for finance, logistics, manufacturing, sales, customer relationship management (CRM) and other areas. The discipline of information systems in the past focussed on the delivery of information to decision-makers in a timely, accurate and complete manner with a minimum of cognitive and economic cost for acquisition, processing, storage and retrieval. In many instances, the implemented technologies have been sufficiently advanced to carry out the required tasks, but there has been no set of standard conventions for enabling them to work together (Back, 2001: 10).

The implemented technologies rest on scattered networks and incompatible computer platforms throughout organisations. The lack of integration between the functional business processes and defined corporate objectives contributed to the incompatible technologies (Back, 2001: 10-12). Because of the incompatibility, "islands of automation" and "functional silos" have developed. These terms have been used to describe the localised use of technology within a specific functional area. The terms also suggest the difficulty of communication between the islands and beyond the silos. The existence of these islands and silos has been identified virtually throughout every industry. Another contributor has been the fact that knowledge in general and information transfer has not evolved at an equal pace. Technology to create, process and store new information has been introduced without additional technology to provide a means for sharing and connecting that information (Back, 2001: 13).

The transactional systems databases that exist in today's organisations are tremendous stores of business data. Unfortunately, most of them are not designed to provide management information that is needed to be effective and efficient and that could be found in these systems and other organisational information systems. Productivity is to create an information environment that allows managers to make fact based timely decisions. These decisions are based on a common understanding and view of the organisation and its performance objectives (Cognos, 2001: 3).

Information is deemed superior to data for decision-making, because information has meaning that is not inherent in raw data. Unfortunately decision-makers need more than information; they need understanding at many levels of abstraction. The definitions of the term's data, information, knowledge and wisdom must be considered in the context of

decision-making. It might be useful to think of them as a hierarchy of understanding (Briggs, De Vreede, Nunamaker, & Sprague, 2002: 5).

Organisations must create a common view of the business across the entity. Data must be consolidated from transactional and operational sources and build in their unique business rules to provide the right context for effective decision-making. Massive amounts of corporate data must be distilled and packaged to provide timely, relevant, and actionable information to a broad range of users with diverse information needs (Cognos, 2001: 4-6).

Reliable co-ordinated information must be delivered to all users, to provide a single consistent view of the organisation. Everyone must be able to access the same data. Managers in different departments or geographies are united by a common information language and understanding. In this way, various decisions are effective independently, and more effective as a whole for the organisation. The potential of established enterprise systems must be fully released (Cognos, 2001: 4-6).

Effective information management requires an infrastructure that integrates different data approaches and various data assets. Deciding which data sources to leverage and where to focus the solution should depend on the user need for information and the variety of reports required. An integrated information management environment is a powerful mean for an organisation to identify and define its problems and opportunities. Information is integrated to illuminate deeper and deeper layers of context. Users must be able to move through information to explore trends and gain insights (Cognos, 2001: 10). For example, a senior manager may start with a scorecard to focus on the key performance indicators the organisation has set for itself. If an element of the scorecard is below expectations, the manager must be able to choose the sub par indicator and drill down for more detail. There may be also management reports available that give context to the performance measure and the manager must be able to explore that and even delve deeper.

The manager must be able to link to the related transaction level details through a specific query against the relational database. Users must explore data in a focussed way rather than wander through it. This means that users begin with an appropriate summary level and go to the necessary level of detail to answer their question (Cognos, 2001: 10). This saves time and reduces database traffic wasted on unfocussed queries. Resource intensive queries should not strain the organisations transactional databases unnecessarily. An effective knowledge management program will ensure improved efficiency and higher productivity in most business functions (Nonaka, 1991: 98-99).

2.7 ENTERPRISE RESOURCE PLANNING

Enterprise resource planning software systems encompass a wide range of software products supporting day-to-day business operations and decision-making. Enterprise resource planning serves numerous functional areas in an integrated fashion, attempting to automate operations from supply chain management; inventory control; CRM, financial and cost accounting, human resources and almost any data orientated management process. Most organisations have software systems that perform many of the component functions of ERP. Examples of these systems are FIMS, LIMS and Human Resource Information Systems. The most widely adapted ERP package today is the Systems Application Products in Data Processing (SAP) R/3 system (Hitt, Wu, & Zhou, 2002: 72).

Enterprise resource planning software enables organisations to integrate their transaction management and business processes across the entire organisation. This integration has enabled ERP to become the de facto replacement of legacy systems worldwide (Gefen & Ridings, 2002: 48). Positive benefits can be achieved from the automation, process redesign activities, and increased timeliness or output quality associated with the successful implementation of an ERP system. The ERP benefits can be grouped into four categories (Hitt, et al., 2002: 72-73):

- Improve information flow across sub-units through standardisation and integration of activities;
- Enable centralisation of administrative activities;
- Reduce information systems maintenance cost and increase the ability to deploy new information systems functionality;
- Enable a transformation from inefficient business processes towards accepted best practice processes.

A standardised and integrated ERP software environment provides a degree of interoperability that was difficult and expensive to achieve with stand alone, custom-built systems of the past. The transactional systems of the SANDF for example OSIS and CALMIS are good examples of stand-alone custom built systems. The ability of ERP systems to disseminate timely and accurate information enables improved managerial and worker decision-making. However the implementation of an ERP system requires a

substantial investment of time, money and internal resources and is fraught with technical and business risk. Installation takes between one and three years, with benefits starting to accrue in an average of three years (Hitt, et al., 2002: 72).

Enterprise resource planning implementations are also known to be difficult. Part of these difficulties is due to the persuasiveness of the change associated with ERP. User resistance is one of the major reasons why ERP implementations fail. There is a need for simultaneous process redesign of multiple functional areas within the organisation and the need to adapt processes to the capabilities of the software. Although ERP systems are packaged software applications, the majority of project cost is devoted to set-up, installation and customisation of the software services typically provided by outside consultants (Hitt, et al., 2002: 72-73).

2.8 THE SOCIAL CONTEXT OF INFORMATION MANAGEMENT

The major problems that occur in information management usually result from the reluctance of organisations to address the people and cultural issues associated with knowledge management. In environments where an individual's knowledge is valued and rewarded, a culture that recognises tacit knowledge and encourages employees to share it is critical and must be established. Employees should be recognised and appraised for their motivation to share knowledge and their contribution to the intellectual assets of the organisation. After all employees are asked to surrender their knowledge and experience – the very traits that make them valuable as individuals (Santosus & Surmacz, 2003) when they are appointed in an organisation.

Information systems and information technology have played a significant role in the development of the modern business environment. The advances in information technology have allowed complex operating processes to be accelerated and made management information available almost immediately. Flexibility and speed are increasingly seen as the key to successful business operations. The infiltration of information technology into almost every area of business means that the vast majority of employees are now expected to utilise information technology in the execution of their tasks. Both employees and employers require information technology skills to be successful (Chartered Institute of Management Accountants (CIMA) Study Text, 2002: 215-218).

The introduction of open systems and interoperability means that any party can share and exchange information and facilities with other parties without having to use the same service provider or technology platform. Interoperability facilitates the formation of strategic alliances

and encourages collaboration across organisational boundaries. The reliance of organisations on information technology commits an organisation to continual change. Systems are likely to be superseded after a few years. These changes forced upon organisations should be systematically planned and implemented.

The computing culture of an organisation can be defined as the ability of the organisation to handle the various dimensions if information technology. The computing culture in existence in organisations must be determined before key decisions are made about upgrading existing or implementing new technologies or systems. The exposure and effective usage of information technology within organisation will directly influence the computing culture of an organisation (Sulcas, 2003: 13).

The level of computing culture in organisations will provide an indication for the successful implementation of any information technology infrastructure change. Because of the far-reaching implications of information technology, it is recommended that external consultants should be utilised for conducting the evaluation of organisations computing culture. Ensuring a successful implementation requires an appropriate computing culture level. Attempting to implement information technology into an organisation that has not developed the culture to match this will inevitably reduce the possibility of success. This translates into organisational readiness for information technology in terms of having evolved over time a positive computing culture (Sulcas, 2003: 12-13).

According to Spacey, Goulding & Murray (2003: 65) most employees are excited by new technology and enjoy using it, but there are still a substantial number of employees who are against the implementation of new technology. Human fears of technology may emerge because of the way it is introduced, or the increase in use that appears to threaten the status quo. This includes the fear of being left behind, or replaced by others who have the relevant technology skills. These negative reactions to technology displayed by individuals are generally termed "resistance to technology". This might take the form of an unwillingness or inability to be trained and to learn the new system.

Resistance is a natural and normal response to change, because change often involves going from the known to the unknown. Resistance to change has long been recognised as a critically important factor that can influence the success or failure of an organisational change effort. Thus resistance, in an organisational setting, is an expression of reservation, which normally arises as a response or reaction to change. Management normally witnesses this expression as actions by employees perceived to attempt to stop, delay or alter change.

Resistance therefore is linked with negative employee attitudes or with counter-productive behaviours. People do not resist change, they rather resist the uncertainties and potential outcomes that change can cause. Resistance is usually a symptom of more basic problems underlying the particular situation. As such, resistance plays a crucial role in drawing attention to aspects of change that may be inappropriate not well thought through, or perhaps plain wrong (Waddell & Sohal, 1998, 543-546).

2.9 INFORMATION MANAGEMENT MATURITY

Information is recognised as a critical business currency that drives business performance and enhances business partnerships and therefore information is like any other resource an enduring asset of value to an organisation. The information life cycle (illustrated in Figure 2.1) identifies the major stages of the life of the information inside organisations (Ladley, 2003).

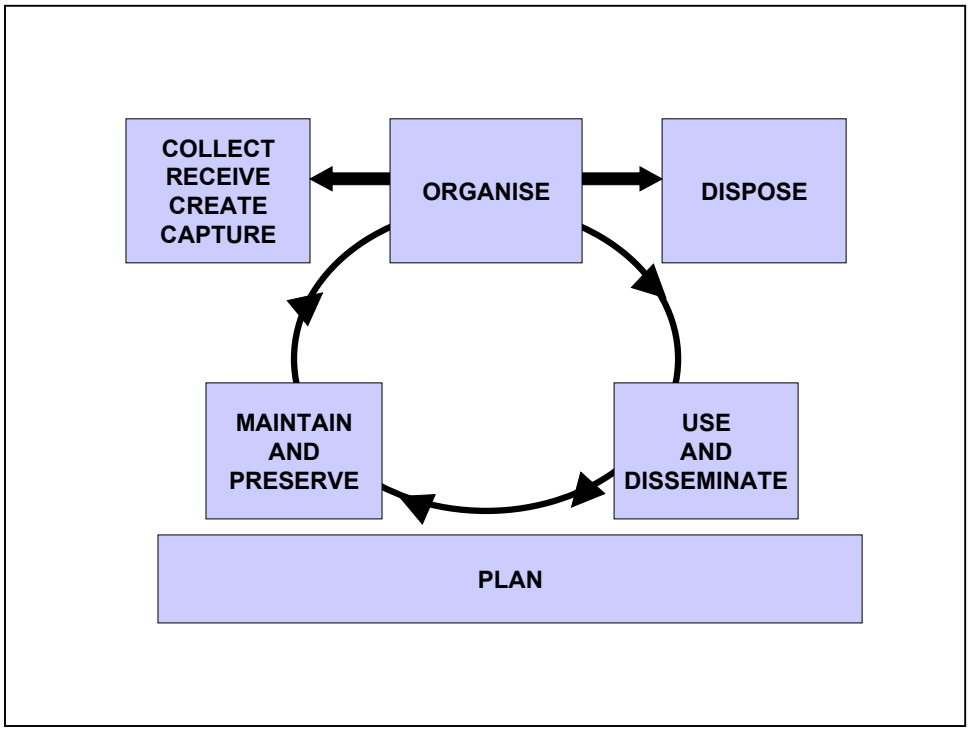


Figure 2.1: Information Life Cycle (Treasury Board of Canada, 2003: 26).

Organisations must acquire or develop the ability to support each phase of the information life cycle. The information management maturity of organisations gauge (measure) how well organisations manage the information life cycle and leverage information as well as knowledge to achieve organisational objectives. Only by measuring information

management maturity can organisations establish appropriate programs, policies, architecture and infrastructure to manage and apply information and knowledge more effectively to achieve organisational objectives. Currently no international recognised information management maturity model/index exists (Seiner, 2003: 2-4). The acceptance of information as a strategic resource will prompt organisations to fashion custom indicators to measure information management maturity inside organisations.

The level of data quality maturity inside organisations can be used to provide organisations with an indication of their respective information maturity. Data quality maturity of organisations can be measured on a scale of one to 5. The respective data quality maturity levels are (Seiner, 2003: 1-4):

- Level 1: Aware. Organisations at level 1 have some awareness that data quality problems affect business execution and decisions making. No formal initiatives to clean data exist. Information is perceived as an occasionally interesting by-product of the organisation and the stakeholders of the organisation are more annoyed by data quality issues than the employees themselves.

- Level 2: Reactive. At level two maturity, decisions and transactions are often questioned due to suspicion or knowledge of data quality issues. Information is perceived as a tool to greater business process understanding and improvement.

- Level 3: Proactive. Moderate data quality maturity is achieved when information is perceived as a genuine fuel for business performance. Data quality orientated administration guidelines have been issued but are not monitored or enforced.

- Level 4: Managed. Information is perceived as a critical component of the information technology portfolio and talked about as an information technology asset. Data quality is regularly measured and monitored for accuracy, completeness and integrity at an organisational level across all functional systems.

- Level 5: Optimised. Information is considered as an organisational asset (not merely an information technology, treating it much in the same way as financial and material assets. Data quality is an ongoing strategic organisational initiative with demonstrable return on investment.

The level of information management maturity is an indication of how effective and efficient organisations utilise the resource information. Any organisation strives towards a high maturity level, maintained across all departments and business functions of an organisation. The key aspects of any discussion around maturity are that organisations are beginning to see that there is a predictable curve to information production and usage (Ladley, 2003: 1).

The current and desired levels of maturity within an organisation must be addressed if information is perceived as an asset. An organisation can only develop principles, guidelines and governance that affects all aspects of information management after the current and desired state of maturity have been determined.

2.10 THE INFORMATION AUDIT

Orna (1999:69) defines an information audit as a systematic examination of information use, resources and flows, with verification by reference to both people and existing documents, in order to establish the extent to which they are contributing to organisations objectives. An information audit is therefore a process used to identify the information needs of the organisation and assign a level of strategic importance to those needs. The resources and services currently provided to meet those needs are identified and information flows within an organisation and between an organisation and its external environment are mapped. It includes the analysis of gaps; duplication, inefficiencies and areas of over-provision to enable the identification of insufficient practices where changes are required (Henczel, 2000: 216).

The primary purpose of an information audit therefore is to identify what information exists within the organisation, where it resides, who uses it, at what cost and to what effect. It establishes where information needs exists that are not being adequately catered for within the present environment. The audit will highlight the areas where information resources are maintained, but have become redundant to either current or future requirements. It will also assist in measuring the information management maturity of organisations (Swash, 1997: 314).

There is no standard or prescribed approach to an information audit. The process is an organisational wide survey, which involves mapping the information resource entities of the organisation. To assist managers the audit procedures can be broken down into the following steps and used as a starting point (Dubois, 1995, 21): planning; survey; summary of current situation; report (includes recommendations for actions) and the establishment of monitor mechanism.

The audit requires a co-ordinated and coherent approach for which the backing and support of senior management is an essential ingredient (Dubois, 1995, 20). To obtain maximum benefits, the information audit should be an organisational wide activity. The benefit of an audit is not the report or information map but the recommendations for rationalisation and improvements that arise out of the analysis of the audit results (Swash, 1997: 314).

The information acquired from the information audit should focus primarily on business activity. Audit questions should seek to identify what information is central to business need, what sources are actively used and how often. The audit includes the information technology infrastructure that is used to provide access to the information. This will reveal users perceptions of the reliability and appropriateness of information systems. Similarly, feedback on how compatible these systems are with other systems and the consequences arising from the inability to transfer data between systems may give some indication of how efficiently data are being processed (Dubois, 1995, 21).

Issues of competence could be explored to examine how well equipped operators are to perform routine and complex tasks and the extent to which existing systems are utilised. The information audit should make a clear distinction between the costs of acquiring and maintaining information and information systems and the benefits, or potential benefits, arising from the correct interpretation of the information obtained from the information and communication technology (Swash, 1997: 317).

It is clear that the information audit addresses both information systems and MIS use in organisations. Organisations can also conduct an independent information system or MIS audit. A clear distinction must be made between the two. The audit of the information systems of organisations includes the (Collier & Dixon, 1995: 26) review of reliability and integrity of computer-produced information and the review of systems established to ensure compliance with organisational policies, plans and procedures as well as existing laws and regulations. The information systems audit also includes a review of the safety of computing facilities, a verification of the existence of computing facilities and the appraisal of the economy and efficiency which information systems are employed. This includes a review of operations or programmes relating to information systems function to verify whether results are consistent with established objectives and goals.

The audit of MIS differs from the audit of information systems in that it focuses on information for decision making by managers. Such audits include compliance (procedures are followed)

audits and operational (effectiveness and efficiency) audits. According to Collier and Dixon (1995: 30) there are no universally accepted model for the MIS audit process because of the varying organisational objectives, functions, structures and circumstances.

2.11 CHARACTERISTICS OF AN EFFECTIVE SYSTEM

The information system should provide information that is consistent, accurate, timely, economically feasible and relevant. Other characteristics of a good information system are that it (Du Plessis, 1994: 6-7):

- Establishes standards to enable managers to write procedures on how to do the job;
- Specifies each area's responsibility so that managers will be accountable individually for the work they manage;
- Must be easily understandable to enable the day-to-day user to utilise it effectively and efficiently;
- Provides evaluation criteria that can be used to judge the performance of the system;
- Identifies the decision points so that proper decisions can be made in the work flow progress;
- An information system is designed with the required hardware, software and interfaces for effective and efficient utilisation.

2.11 SUMMARY

This chapter examined some of the fundamental theoretical concepts associated with the management of information inside organisations. A good comprehension of these theoretical concepts is required to understand the importance of effective information management practices inside organisations. The development of information systems was discussed with specific reference to the current information systems in use in the SANDF. In building information systems infrastructures the hierarchy style would be suitable for the SANDF.

An information system was defined as a collection of people, procedures, a base of data and hardware and software that collects, processes, stores and communicate data in accordance

with defined procedures, whether automated or manual. Information systems are not seen as simply a tool to record transactions and processes but as an asset, which can change the structure and strategy of any organisation. Information systems therefore should support the strategy of the organisation and provide management with information to assist them in problem solving and decision-making. Specific systems are designed for this purpose and are labelled as MIS.

A MIS was defined as a computer based system that makes information available to managers' at all organisational levels and in functional areas of an organisation. Organisations have become dependent on the flow of information and in doing so have created a knowledge economy. For this reason, an organisation derives the most value from intellectual rather than physical assets. To achieve this knowledge (tacit and explicit) it must be shared and serve as the foundation for collaboration. Information management therefore is a critical tool for organisational success. Effective information management requires an infrastructure that integrates different data approaches and various data sets.

Enterprise resource planning software enables organisations to integrate their transaction management and business processes across the entire organisation. The reliance on information technology commits an organisation to continual change. Resistance is a natural and normal response to change. Resistance to change and the effective management thereof is recognised as a critically important factor that can influence the success or failure of any organisational change effort. The level of the computing culture in organisations provides an indication of the success of any information technology infrastructure change initiative.

Organisations should support each phase of the information life cycle. By measuring information management maturity, organisations can establish appropriate programs and policies to manage information more effectively and achieve organisational objectives. Information management maturity measures how effective and efficient organisations utilise the resource information. Information audits are used in determining the level of information management maturity inside organisations. Information audits are management tools to assess how well information services are performing and the main method of formulating and directing information policies. Information audits results are used to formulate information policies to ensure goal congruence between organisational wide objectives and information management objectives. In conclusion, the characteristics of an effective system were addressed.

CHAPTER 3

A SCIENTIFIC APPROACH TO INFORMATION MANAGEMENT INSIDE THE SANDF

3.1 INTRODUCTION

The importance of information in the management of organisations tends to be insufficiently highlighted and it is sometimes hard to grasp its role. Since it is difficult to measure the value of information, attention should rather be on the resources to produce information. Although the term data and information often are used synonymously in practice, managers differentiate information from data intuitively and describe information as data, which have been processed in some way to be meaningful and useful to its recipient (Lewin & Harris, 2001: 2). Information management and information technologies are inseparable. Many managers believe that the effective management of information require more time and attention than managers feel they have. However, these difficulties do not deter many organisations intent on profiting from the information revolution. Managers constantly receive advice and offers of help from local specialists, academics, suppliers of information hardware and software and from consultants on how to manage their information and information technology systems.

It is generally agreed that all managers perform the same functions at different degrees and play the same roles. Such functions include planning, organising, staffing, directing and controlling. All managers perform these functions to some degree although perhaps with varying emphasis. In performing their functions and playing their roles, modern managers utilise tools and procedures to increase the likelihood of success. Combined with basic management skills these tools and procedures achieve levels of performance that were impossible a few years ago. For example a modern manager can use the computer to transmit decisions electronically throughout the organisation; such ability was not available to the manager of the sixties or even seventies (Mcleod, 1999: 8).

One of the purposes of information systems is to provide information for the overall purpose of control and systems are designed to support the control of the business. Users of information systems require other information than information to support control of the business directly. Information improves the user's knowledge and understanding of the topic to which the information relates and adds value to the product and services and assists in planning.

3.2 TYPES OF INFORMATION PROVIDED BY INFORMATION SYSTEMS

Too much information or too little information will be counter productive. The following types of information must be produced by the information systems of organisations: operational information; information for decision-making; performance information and community information.

3.2.1 Operational Information

Operational information is necessary for the delivery of all services and products of an organisation. The largest volume of information is associated with the essential operational systems that support primary operational processes and which is essential for the effective day-to-day running of the organisation. This range of systems cannot provide all the information required for management purposes because they have been designed to meet the specific operational needs of their users. Without change or adaptation, they may not be capable of producing the information needed by management (Ward & Griffiths, 1999: 366).

According to Haasbroek (2002), the current transactional systems of the SANDF cannot produce the operational information required by management due to the inconsistencies in data provided by the transactional systems. This leads to inefficiencies and incorrect operational information delivery to management. Improving the management of basic operational information can lead to the more efficient use of staff, improved service to customers and the availability of more and better information for management purposes.

3.2.2 Information for Decision-Making

Information technology, if used effectively, play a very important role in collecting, organising and reporting of information to executives for decision-making (Republic of South Africa, 1999). At every level in the management structure good information is vital to good decision-making. A decision is as good as the information it is based on. With access to the right information, managers are able to deploy their resources to better effect; they can identify and rectify service failures, monitor spending against the budget, and in general exert closer control over their services. Executive Information Systems were therefore developed to serve the information needs of managers and these systems provide relevant and timely information to managers for decision-making (Kumar, 2000: 1).

The Public Finance Management Act (PFMA) states that timely and quality information must be provided to assist managers in the public sector with decision-making (Republic of South Africa, 1999). According to Coetzer (2002), the current information systems of the SANDF cannot provide managers with the required information to assist them to deploy their limited resources efficiently and exert closer control over their respective services.

3.2.3 Performance Information

In the past few years, increasing emphasis has been placed on accountability of managers at all levels in organisations. True accountability requires that managers are able to justify and explain the decisions they have made. The PFMA places the same requirements on commanders and managers in the SANDF (Republic of South Africa, 1999). Performance information is essential to this process. A performance measurement system is necessary to enable performance information to be provided in an orderly way. A fully effective system should provide information about (The Local Government Management Board, 1995: 7-8):

- Outcomes: The benefits received from services compared to the objectives of each service.
- Outputs: The level of service actually delivered.
- Performance: Outputs achieved compared to the targets set.
- Efficiency: The resources used to achieve the outputs.
- Finance: The income and expenditures of organisations against the budget of the organisation.

As with all other forms of information, it is important to identify clearly how performance information will be used before time and effort is put in arranging for its provision. The reporting of performance information and its use in the decision-making processes require careful thought since there is virtually no limit to the volume of information which can be derived. The provision and management of information should be led by the needs of the organisation. In this regard, feedback from customers is one of the very important aspects of performance information.

3.2.4 Community Information

Members of the community require many different types of information (The Local Government Management Board, 1995: 7-8):

- Individuals want to know where to find key organisations, businesses, health services, recreation facilities and associations. Organisations have large quantities of information that they can provide either free or at a small charge as a service to the public.

- As customers, members of the public will need information about the services available to them, what quality of service they can expect, how much it will cost and how to complain if they are not satisfied.

- Members of the community are stakeholders in many organisations and need to be informed why certain decisions are made.

The use of modern technology offers a range of ways in which such information can be made accessible to the public, for example, electronic notice boards and electronic communication. The SANDF realised the importance of public opinion with the creation of a defence secretariat headed by the Secretary of Defence. The first step in keeping the public informed about decisions taken is the development of the DOD policy intranet web site (Republic of South Africa, 2002a: 4).

The objective of the DOD policy web site is to host the current version of the DOD policies and publications and to make it available to all members of the DOD who require access to it. The intranet makes it possible to update policy documentation with immediate effect thus supporting, enabling and speeding up transformation and transparency in the SANDF (Subroyen & Marais, 2002: 35-36).

3.3 THE PRINCIPLES OF MANAGING INFORMATION AS A PRODUCT

If in the modern world information is to be viewed as a resource of comparable importance to staff, assets and finance, it must be procured and managed as purposefully as any other resource. Information must be managed as a product. Failure to do so has a negative impact on an organisation relationship with its stakeholders on all levels. According to

Huang, Lee & Wang (1999: 17) in managing information as a product, organisations must follow the next four principles:

3.3.1 Understand Consumer's Information Needs

Organisations must specify the needs of two types of consumers: the external customer of the organisation and the internal information consumer. External customer organisations, for example must be able to open new accounts, maintain customer risk portfolios and know all related information of a particular customer. Internal consumer's organisations must provide real time information to all management levels inside the organisation. The SANDF realise the importance to identify the information needs of their consumers and these needs are summarised in the DOD information requirements (Republic of South Africa, 2001: 1). Without the availability of real time information managers will not be able to make well-informed decisions. This will result in additional costs of rework time and time delays, which negatively affect the efficiency of the organisation (Huang, Lee & Wang, 1999: 19).

3.3.2 Managing Information as the Product of Well-Defined Information Production Process

Information must not solely be treated as the by-product of a physical event, but rather as the product of a well-defined information production process. Managing information as a by-product will fail to meet the needs of the external customers as well as the internal consumer of information.

To contrast the by-product approach to the information-as-product approach five factors should be analysed (Huang, Lee & Wang, 1999: 19-20):

- What is managed?
- How is it managed?
- Why manage it?
- What is success?
- Who manages it?

The summarised explanation of the five factors that should be analysed is provided in Table 3.1.

Table 3.1: Manage Information as a Product versus By-product (Huang, Lee & Wang, 1999: 21-24).

	Product	**By-product**
What is managed?	Information Information product life cycle	Hardware and software systems life cycles
How is it managed?	Integrated, cross-functional approach Encompass information suppliers, manufacturers, and consumers	Integrate stove-pipe systems Control of individual components Cost Control
Why manage it?	Deliver quality information products to consumers	Implement quality hardware and software systems
What is success?	Quality information product continuously delivered over the product life cycle! No Garbage-In-Garbage-Out (GIGO)!	The system work! No bugs!
Who manage it?	Chief Information Officer (CIO) Information Product Manager	CIO Information technology directors Database administrators

3.3.3 Managing the Life Cycle of Information Products

The information product life cycle can be defined as the stages through which information goes from introduction to obsolescence. The cycle can be divided into four stages: introduction, growth, maturity, and decline. The quality of the information must be maintained over the life cycle of the information product as defined above. The DII is a comprehensive set of components that is utilised to capture, store, communicate, process and present information in the DOD. The enabling system supports the information and data through its life cycle in the DOD. The enormous budget cuts over the last five years had adversely influenced the level of technology in the SANDF (Needham, 2000: 5-13). Furthermore, the quality of the information normally deteriorates over time (Huang, Lee & Wang, 1999: 20).

3.3.4 Appointing an Information Product Manager

The information product manager will be responsible for monitoring and capturing consumer needs continually, and reconcile these varied needs by transforming the knowledge into a process of continuous improvement. The result is the establishment of information measures or controls (Huang, Lee & Wang, 1999: 20). The SANDF did appoint an information manager in 2001 (Needman, 2000: 5) and since then the Director Command Management Information (CMI) Directorate ICT manages the information processes and resulting products of the DOD.

3.4 THE USE OF INFORMATION SYSTEMS BY ORGANISATIONS

To take advantage of the data and information as a resource it is necessary to understand the structure and have knowledge about the collections of information. The critical point is that a formal method is needed for collecting, documenting and validating information. The methodology revolves around ensuring that the information that is present in the system meets or betters the expectations of what the value of the system is. The organisational structure is normally used as a starting point to establish a formal method for collecting, documenting and validating organisational information (Loshin, 2001: 9). This method of building information systems infrastructure is called the hierarchical style and is currently applicable to the SANDF (Bentley, 1998: 7).

A business organisation is a complex, formal organisation with the aim to produce products or services at a profit over the long term. Non-profit organisations (like churches and public interest groups) and government agencies, all of which are complex formal organisations, do not operate to produce a profit. The information systems found in these organisations (government agencies like the SANDF) and business organisations (private sector) are similar (Laudon & Laudon, 1998, 39).

Organisations co-ordinate the work of employees through a hierarchy in which authority is largely concentrated at the top. The hierarchy typically comprises an operational layer, a knowledge layer, a tactical layer and a strategic layer. The knowledge layer is a group called knowledge and data workers, who design the product or service of the organisation (engineers) and administer the paper work associated with a business (clerical workers). All authority is never solely concentrated at the top (Licker, 1997: 25).

Organisations differ in terms of how much authority is concentrated in each layer. Some organisations are "flat" with a small group of senior managers (strategic layer) and a single layer of middle management (tactical layer), followed immediately by production workers (operational layer). Other organisations are much more bureaucratic and may have as many as fifteen layers of management between the senior group and the production workers (Licker, 1997: 26). The hierarchy of the SANDF also consists of these layers. The implementation of the GSB concept suggests a flatter organisational structure (Craig, 2001).

Managers at all levels of an organisation use information. Organisations face mostly two mutually inclusive problems: how to manage their internal forces and groups that produce their products and services and how to deal with customers, government agencies, competitors and general socio-economic trends in their surrounding environment. Organisations build systems to solve organisational problems and to respond to a changing environment. As external and internal forces change new systems are required and old systems must be modified or abolished. Some information systems deal with purely internal problems, some with purely external issues and some with both. Systems are categorised by the functional speciality they serve and by the type of problems they address. For example, a functional system is the logistical systems of an organisation and EIS address problems of management (Laudon & Laudon, 1998, 46-48).

Information at the lowest level includes historical information about performance as well as information on the goods and services produced. At this level, information is usually derived from the organisation itself. At tactical level, information concerns schedule, revenues, profits and costs as well as other economic indicators. The performance of the organisation is of interest, how the performance translates into profits or other resources that affects managers. At the strategic level, managers are concerned with policies, plans, budgets and objectives. Information of importance comes from sources outside the organisation and the information covers a wide scope typically including all functions and divisions within the organisation. The information is orientated towards the future, collected infrequently and generally summarised. The general picture of trends is the most important aspect, not accuracy (Licker, 1997: 25-27).

The method of requesting information, how it is used and disposed of varies from management layer to management layer. Information to strategic layer management might resemble chaos to operational layer management, while managers at the strategic layer may find the information that their line managers use to be narrow and restricted. Managers on different levels execute different tasks and for this reason have different information needs.

No single system governs all the activities of an entire organisation. Organisations have different kinds of information systems to address different levels of problems and different organisational functions. Figure 3.1 provides a single integrated view of the role of information systems in organisations. The information characteristics of each level of management are also provided.

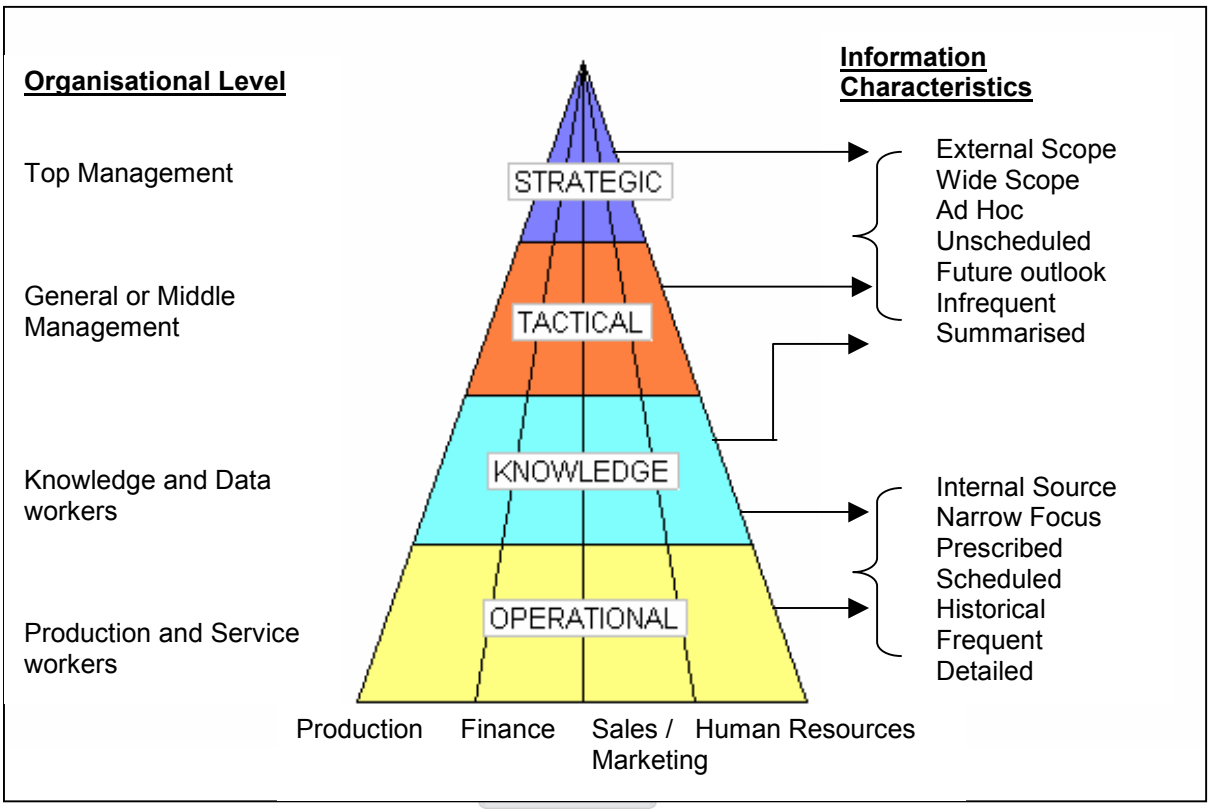


Figure 3.1: The Role of Information Systems and Information Characteristics (Adapted from Licker, 1997:26 & Laudon & Laudon, 1998: 48).

Specialised information systems serve different functions and organisational levels. Strategic level systems assist senior managers in planning the firm's long-term course of action. Tactical systems help middle management supervise and co-ordinate day-to-day business activities.

Knowledge and data workers use knowledge systems to design products, streamline services, and cope with paperwork, while operational systems deal with day-to-day production and services activities. Examples of organisational information systems are manufacturing and production systems, sales and marketing systems, finance and accounting systems, human resource systems and logistical information systems (Laudon & Laudon, 1998: 49-66).

3.5 INFORMATION AS A STRATEGIC RESOURCE

An organisation exists in an environment consisting of elements such as customers, suppliers, the government and competitors. The main objective of an organisation is to maintain efficient operations within the constraints that the environment imposes. With this understanding of the environment, management seeks to employ all of its resources in such a way that it will achieve competitive advantages to provide the organisation with an edge over its competitors in meeting the customer's needs. Organisations recognise that one of the resources that can produce a competitive advantage is information (Mcleod, 1999: 705-706).

If a firm is to achieve competitive advantage, it is necessary that efficient and effective information flows must be established within all environmental elements. The flow of information differs from the flow of material in several ways of which the most important could be that information moves not only in a horizontal direction from left to right, but also horizontally from right to left and in vertical directions (Tilanus, 1997: 169). The efficiency of internal operations remains extremely important in achieving the advantage. Organisations must build value into all of its operations.

Thompson & Strickland (1999: 114) and Horngren, Datar & Foster (2000: 14) use the term "value chain" to describe the sequence of activities that a firm performs in providing its products. Organisations value chains consist of inbound logistics activities that acquire materials from suppliers; the internal operations; outbound logistics, which make the products available for sale; marketing and sales activities and customer service after the sale. Each of these activities has a physical component to perform the activity and an information component that provides the required information (Porter & Miller, 1985: 149-160).

An example of the information component of inbound logistics is the information needed to acquire materials from the supplier. When a firm links the value chains of its suppliers, channel members and customers to its own, it creates a value system. Upstream value is achieved through relationships with suppliers, and downstream value is achieved through relationships with channel members and customers (Porter & Miller, 1985: 149-160). A decision to become a participant indicates that management has recognised the importance of the organisation being part of a larger environmental system. By establishing co-operative relationships with other elements involved in the resource flows, each of the firms achieves a higher level of performance (Thompson & Strickland, 1999: 116-117).

In 1994, the DOD decided to follow a process approach towards organisational structuring (Republic of South Africa, 2002b: 38). The DOD decided on high-level business processes as depicted in the following value chain for the DOD (Figure 3.2).

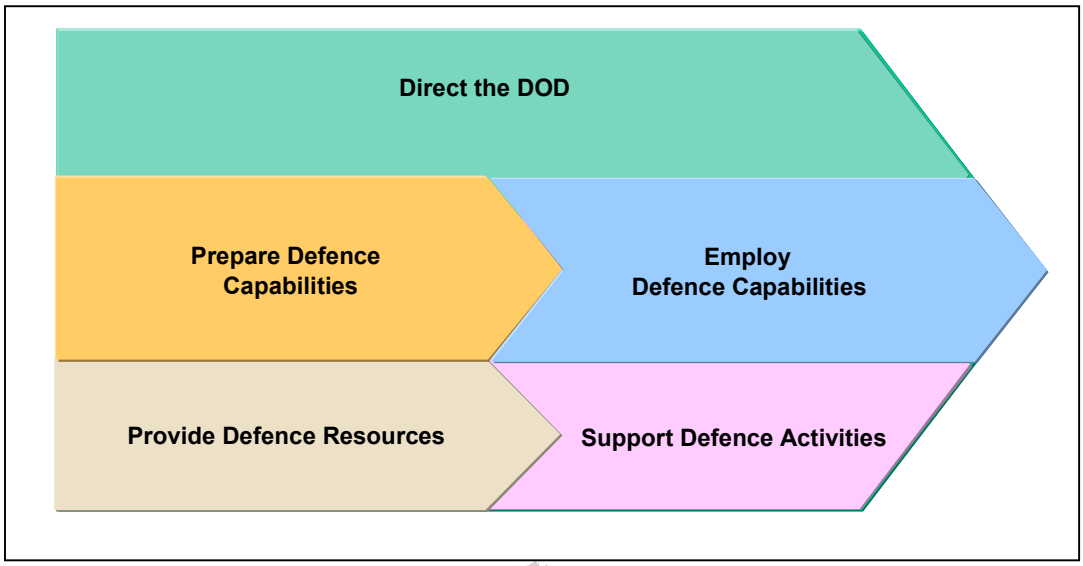


Figure 3.2: The Value Chain of the DOD (Republic of South Africa, 2002b: 39).

The five business domains reflect the total DOD business and need to be supported by the resource information and its ICT enabling mechanisms. Each of these activities in the value chain of the DOD has a physical component that performs the activity and an information component that provides the required information to the activity (Thompson & Strickland, 1999: 115). Information in the SANDF is classified as a support defence activity and labelled as support defence information. The existence of information flow is evident between all of the activities in the value chain of the DOD as illustrated by Figure 3.3.

If information is to be used as a resource to gain a competitive advantage, then such use must be planned. The planning requires the support of top management and it must be long term in nature. Strategic planning for information resources is the relationship between the organisational overall objectives and its plans for its information resources. The information resources must be used to support the achievement of the broader organisational objectives. The status of the information resources influences the strategic plan of the entire organisation. The organisation takes notice of its information capabilities as it considers what it intends to accomplish in the future. This enables top management to correct any deficiencies in the information systems that might weaken the ability of the firm to accomplish its objectives. It also enables the firm to capitalise on any strength that might by used to achieve competitive advantage (Mcleod, 1999: 709-713).

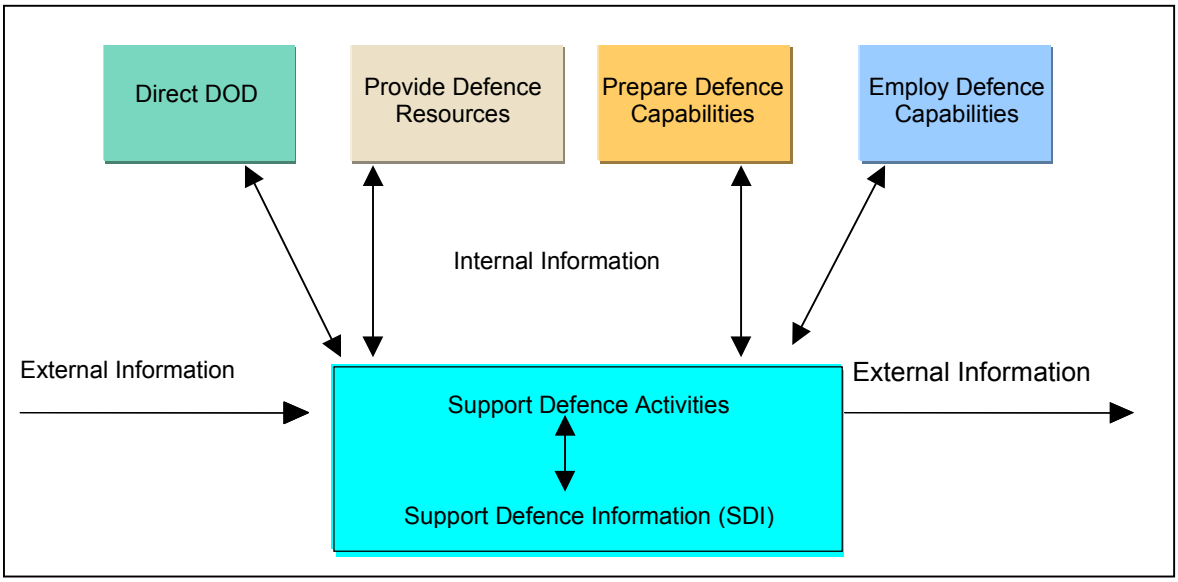


Figure 3.3: Information Flow Inside the Value Chain of the DOD (Adapted from Republic of South Africa, 2002b: 44).

Mcleod (1999: 714) believes that such planning might have gone too far and organisations derive more usefulness from lower level system planning than from higher level strategic planning. The attitude of organisations is that if little strategic planning is good, more must be even better. Organisations pay too much attention to the formality of their planning processes and not enough to implementing those plans. Organisations must not only plan how to use their information resources, but should also incorporate those resources in long term planning. Strategic planning for information resources is based on a circular relationship between the firms planning and information plans and how each affects the other (Mcleod, 1999: 714-732).

For information systems to be of strategic value to organisations there are a few key factors that have to be visible within these systems. Hardly ever will an information system show all the factors, but the majority of the factors must be visible. These factors are often at odds with traditional information systems approaches and show more commonality with business innovation (Ward & Griffiths, 1999: 25-28).

- External not internal focus: Organisations must look at customers, competitors, suppliers, even other industries and the business relationships and similarities with the outside world.

- Adding value not cost reduction: Doing it better not cheaper is the norm. Cost reduction may accrue due to business expansion at reduced marginal cost and therefore economies of scale can be achieved.

- Sharing the benefits: In the past, the benefits of systems had not been shared even within an organisation, but instead were used to give departments or functions leverage over each other. Departments used the information provided by the information system to gain an advantage over other departments. Sharing benefits implies a "buy in" commitment to success.

- Understanding customers: Know what to do with the service or product, how to obtain value from it and the problems that may be encountered in gaining value.

- Business driven innovation, not technology driven: Information technology provides a business an opportunity or idea to be converted to reality. The driving force is to come from business and not from information technology professionals. These professionals are supply driven. The users to whom the latest technology is probably of little interest must be the driving force for business innovation. Successes come from good enough technology and a clear understanding of the customer.

- Incremental development: This entails following a step approach, doing one thing, building on, and extending the success by a further development. Applications are developed by trail and error but the process is not stopped when success is achieved but followed by considering what could be done next.

- Using the information gained from the system to develop the business: The information gained from the current systems must be used in the development of future systems.

These factors in general imply different attitudes to the use of information systems and information technology than what have prevailed in the past. This in turn implies that new tools are needed and techniques to uncover such opportunities, as well as new approaches to manage these applications to ensure success. When developing strategies for information systems these points require in-depth consideration.

The question remains, however, what actually produces the success, information technology, information systems or information? Technology itself is the enabler that provides short-term advantage and the opportunity to develop new systems and capture potentially valuable information. Normally competitors can purchase the same technology and the advantages could soon be negated. The newly developed information systems that utilise the technology could provide advantages that may be less vulnerable to erosion by competitive copying. The potential gain will depend on how conclusively and exclusively the systems alter business relationships. In time, the existing competition could redefine the relationship by introducing alternative information systems. The only way to sustain competitive advantage is to use the information provided by the systems to improve the products or services to match the requirements of the market place (Ward & Griffiths, 1999: 27).

The DOD acknowledges information as a strategic resource that is utilised to achieve its business and military objectives. The business of the DOD is the driver of information needs. Information forms the basis for decision-making and effective management. It is of strategic importance that the resource information is managed over its total life cycle in an effective manner and standardised way in order to support the DOD in gaining a competitive advantage (Republic of South Africa, 2002b: 2).

3.6 OBJECTIVES OF INFORMATION MANAGEMENT

The main objective of information management is to satisfy the demand for information and thus deliver value to the organisation. It is the overall effort within an organisation to create and maintain an information resource. Managing the information resource seeks to build up the information assets of an organisation at an acceptable cost, so that it can be employed to deliver value to the business (Mcleod, 1999: 184). It is important to point out that information, as such do not necessarily have to be communicated through computer networks (Tilanus, 1997: 115). The demand is expressed in the information requirements of applications and the information access and delivery services require by users. Value is delivered through (Ward & Griffiths, 1999: 362):

- Enabling the business to make the right decision;
- Improving the effectiveness of processes and their outcomes;
- Providing timely and focussed performance information;

- Improving the productivity and effectiveness of managers and staff will add value.

In managing information, it is presumed that the opportunities for gaining strategic advantage were considered and examined. The information requirements for these opportunities are confirmed. This will be documented in the business information systems strategy with any other information requirements. Since information needs to be managed, it must be weighted according to the value that it will add to the organisation. Information both internal and external, which is crucial to strategic and competitive initiatives, and associated with organisational objectives, represents the greatest value (Ward & Griffiths, 1999: 365).

Not all of this information exists within the available information environment. Actual studies of managers have found that they spend most of their time talking with other people, not analysing statements, calculating results or reading formal reports. This means that the majority of information that top management receives comes from the grapevine in the form of comments, opinions and gossip. Only a very small part of a manager's information comes through the formal information systems or the message systems of the organisation (Laudon & Laudon, 1999: 606).

The information requirements of organisations are organisational driven needs, demanding flexible and often high performance response. To satisfy these requirements a number of different types of responses may be called for (Ward & Griffiths, 1999: 363-364):

- Implementation of newly developed applications that cannot be met from existing applications, and which provide flexible systems that can be adapted as the organisation evolve;

- Initiatives to enable information to be shared in a well-controlled manner;

- Short-term interim solutions to provide access to "locked in" information may be called for. The aim is to obtain value from information in existing but inappropriate data structures;

- The development of an organisational model to facilitate decision-making can also be used.

The secondary objectives of information management can be divided into high potential information, key operational information and support information. High potential information

is frequently new information with unproven value to the business. Its sources, structures and relationships may not be fully understood, and the information requirements must be confirmed so that they can be taken under the information management umbrella at the appropriate time (Ward & Griffiths, 1999: 365).

The largest volume of information is associated with the key operational systems that support primary operational processes and are essential for their effective day-to-day running. Requirements here are driven by avoidance of disadvantage. The focus is on enhancing value by integrating applications and processes, and enabling rapid and consistent communications to the external interfaces. There are also opportunities to improve business productivity and remove duplication and risk of misinformation. These opportunities must be assessed in terms of the benefit they could deliver against the high cost of implementation (Ward & Griffiths, 1999: 366).

Information contained only in support systems, though necessary, is not likely to contain much latent power. It may even be a burden to the organisation when it is constrained by legislation to supply information without any benefits to the organisation. Effort on information management should be kept to a minimum, consistent only with efficiency and necessity (Ward & Griffiths, 1999: 363-364).

3.6.1 Making the Most of Current systems

Even if the long-term plan is to replace existing systems and databases, they will continue to be used for some time since they contain much necessary information and processing functionality. Managers must obtain the maximum contribution from the information in current systems and from the systems still under development.

An organisational data warehouse integrates data resources from different operational systems and forms a more holistic view of the organisation and its operational processes. Data warehouses are normally established to provide managers with information to assist them in decision-making. The resulting integrated view of the organisation and its services will provide the necessary information to take advantage of the complementary roles and interactive effects of different services and product components (Garson, 2000: 450). It is vital to provide efficient access to information in these databases because multiple versions of key subject databases exist and managing information implies managing the differences in actual database versions (Ward & Griffiths, 1999: 367).

Frequently there is a huge investment in systems and in most organisations the cost of maintaining these can be as much as 70 to 80% of the annual expenditure on systems and technology. This means that large amounts of effort have always been devoted in keeping systems operational and making them relevant to the organisation. Such a high figure does not just refer to corrective maintenance in the sense of correcting errors in the implementation of the original specification, but include adaptation and enhancement of the system to meet new and evolving requirements (Hackney &Dunn, 2000: 16-17). The investment cannot be written off, nor can support and maintenance be abandoned. Part of migration planning is to obtain maximum support from current systems. The provision of critical information with the necessary quality attributes should be the migration target, strictly justified against the business need (Ward & Griffiths, 1999: 367).

It is essential to evaluate the contribution of information in existing systems with reference to organisational information needs. Sometimes systems will already have associated information and process models. Frequently this is not the case and the structure and contents of individual systems need to be identified if their value is to be assessed (Ward & Griffiths, 1999: 367-368).

The SANDF supports the methodology that current capabilities should be maintained until replaced. Current systems cannot be frozen in time in order to address all inefficiencies. Maintenance should only focus on inevitable changes such as those required by governance and corrective requirements. The requirements set from a military perspective will receive preference. The preference is supported by the fact that it would promote the DOD ability to perform its core function as mandated (Republic of South Africa, 2002b: 44-45).

3.6.2 Provision of a Stable Integrated Information Framework

It is expected that the number of knowledge workers will continue to increase steadily, as well as the growth in the volume and complexity of internal and external information needs. More people want access to information and the information must be distributed more widely. The benefits delivered by a stable integrated information framework are (Ward & Griffiths, 1999: 369):

- Organisations are better equipped with information to respond, when necessary, to change in the external and internal environment.

- Direct monetary savings are achieved in the end. Duplication and reconciling information fragmentation is more expensive that the initial costs incurred.

- Cross-functional and cross-organisational co-operation is improved by making information available across boundaries to a broad community of authorised users.

- Support is gained for the concept of integrated management along business processes in order to be more customer and market orientated, and thus, more competitive.

3.6.3 The Ability to Respond Rapidly to Dynamic Business Needs

The information framework should facilitate a swift response to an unexpected business need. A completely healthy system and information architecture that can enable a virtually instant response is a rare occurrence. The ability to satisfy unexpected needs can best be provided if consideration is given to them during the processes of information planning. Applying informed second guessing information, potential information needs and their sources, relationships and flows could be built into the initial information architecture (Ward & Griffiths, 1999: 370).

The most appropriate structure for the information systems of any organisation is an infrastructure, which mirrors the organisation itself. The implementation of the conceptual architecture is determined in the planning process of the strategic information systems planning. It is part of the process to look towards future organisations needs before embarking on what could be very extensive developments or redevelopments of systems and information structures (The Local Government Management Board, 1995: 5). The benefits that can then be delivered are swift responses to exploit an opportunity, counter an unexpected attack, build a rapid defence against competitive threats and supply information to assess a business risk (Ward & Griffiths, 1999: 370).

3.6.4 Improved Efficiency and Effectiveness of Information Resources

Improving information systems productivity is an aim of many organisations, and good information planning and management should play a substantial part in meeting this aim. The following factors contribute to improve the efficiency of the information processes (Ward & Griffiths, 1999: 371):

- Increased investment is required to create an appropriate integrated infrastructure. Benefits are reaped over a long period in reduced maintenance costs and largely extended effective life and reliability of applications.

- Critical information is consistent across the business and not plagued by incompatibility problems.

- Employing a well-constructed data dictionary results in less information related program errors and it improves efficiency.

- High-level languages, associated with advanced and reliable database management systems, reduce programming effort considerably.

Duplication of information is very common. It is usually a consequence of independent developments and is often perpetuated by a lack of trust between system owners. It is a source of potential errors when information is entered more than once. Multiple databases, which have grown out of independent developments, can demonstrate a number of differences. They imply polarisation, mistrust and a widespread lack of confidence in combining and sharing information.

In cases like this, the task is more than one of information management; it requires major cultural change. The risks associated with duplication of information input and storage can be greatly reduced by seeking to enter, update and store information only once. Characteristics that determine effectiveness include the availability of required information, ease of access to end users, timeliness, quality, integrity and consistency (Ward & Griffiths, 1999: 370-372).

3.6.5 Principles and Guidelines for Information Resource Management

The following needs to be given careful consideration, both when Information Resource Management (IRM) is introduced and when it is re-assessed and upgraded to meet the changing needs of the organisation, include (Ward & Griffiths, 1999: 374):

- Determining the cost versus value of providing information;
- Defining standards of information quality, accuracy, security and timeliness;
- Responsibilities and allocation of ownership;
- Satisfying the individuals need for information;
- Sources and types of information to be catered for;
- What levels and forms of information should be provided?
- How to determine the scope and methods for key practices, for example, enterprise modelling and information sharing;
- Principles relating to make the user community aware of the scope of IRM, and how to optimise their use of information;
- What constitutes an issue that needs to be resolved, and the means to do so?

Determining the right scope and structure of information to be managed and modelled is a key issue in IRM. The total information environment does not stop at organisation boundaries; it extends into the external environment. The target scope of the managed environment is determined by business needs and priorities. Information resource management has its foundation in its business information systems strategy where information needs are defined, and the information architecture for each business unit is constructed. The ability to share information is usually a requirement when introducing IRM.

In its simplest form, information sharing means that only one copy of a piece of information is held, and that all authorised users have access to it. In practise, this is very difficult to

accomplish. The activities of IRM are information (data) administration, data dictionary administration, and database administration and information access services (Ward & Griffiths, 1999: 375-384). Figure 3.4 illustrates the activities of IRM, matched with the roles required to set up and maintain an efficient industrial plant.

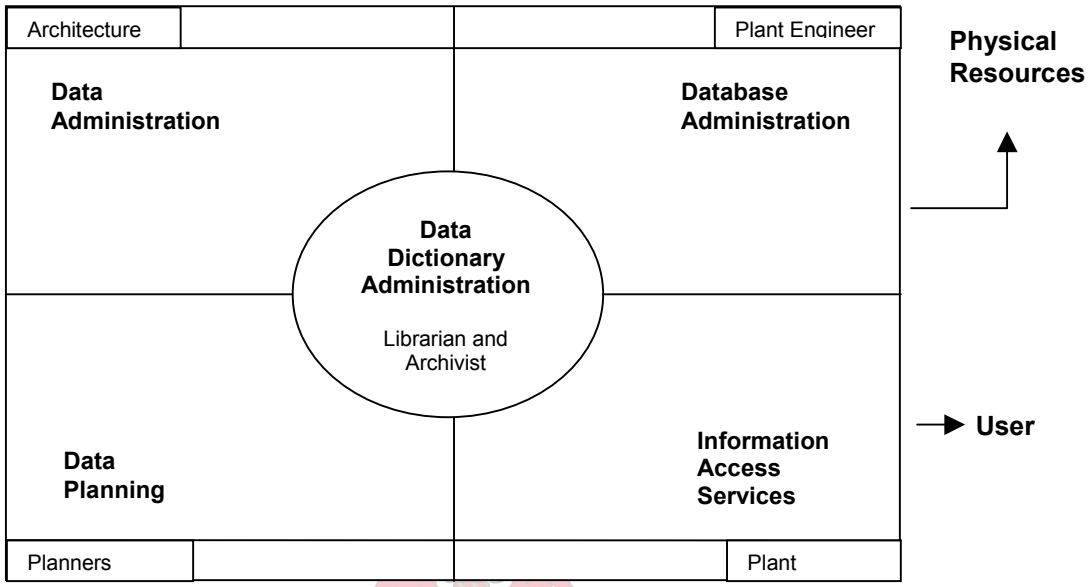


Figure 3.4: Information Resource Management in a Business (Ward & Griffiths, 1999: 380).

For the introduction or extension of IRM to succeed, it must be linked to specific business goals and tied to the achievement of organisational benefits. There are problems associated with implementing IRM. One of the problems is bridging the gap between top down defined databases and existing databases and the resulting need to manage the differences. There may be also difficulties in managing expectations. The different expectations need to be pulled together under the business expectations of improving organisational performance over a long period through optimal exploitation of information systems. The aim is to bring information into the managed environment according to needs and priorities and the risks associated with not managing it. This entails (Ward & Griffiths, 1999: 394-396):

- Focusing on strategic information that must be managed;
- Evaluating the key operational information in the current portfolio and determining how best to exploit its potential at acceptable cost and risk;
- Maintaining a watchful eye on high performance information, which may become strategic;

- Ignore low potential, support information, which does not warrant a high priority for being managed.

The commonality between the management of information in the private (business) sector and the SANDF is illustrated in Figure 3.5. The intersection between business information and communication technology and military information and communication technology is a perspective of the commonality of these environments depicted as the common (shared) operating environment. The geometry of the union and the picture as a whole does not intend to depict the relative importance and size of the environments.

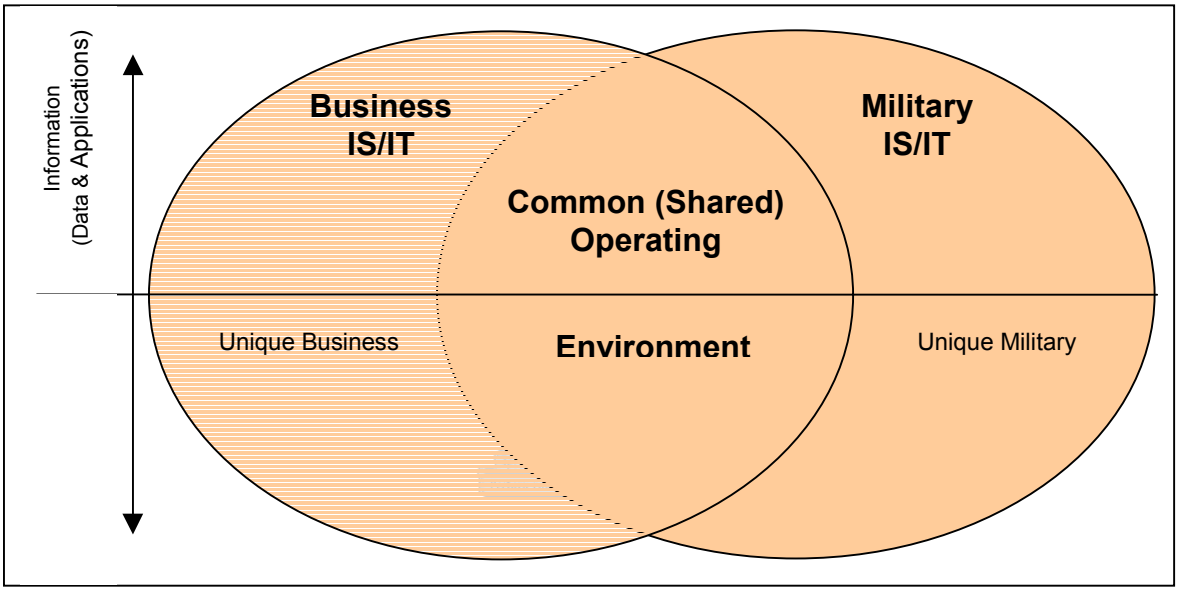


Figure 3.5: The Information Management Environment (Adapted from Needham, 2002: 6)

3.7 SUMMARY

This chapter provided a scientific approach to information management inside the SANDF. In conjunction with Chapter 2, it serves as the theoretical grounding of the study project. The different types of information provided by information systems were addressed. The information systems of the SANDF must provide operational information; information for decision-making; performance information and community information. The information provided by the information systems must be accessible to the users of the information in an utilisable format.

If information is to be viewed as a resource of strategic importance, it must be managed as a product of a well-defined information process and not as a by-product of operations. To take advantage of information as a resource a formal method is required for collecting, documenting and validating information. The organisational structure can be used as a starting point to establish a formal method. This method of building information systems infrastructure is called the hierarchical style and is applicable to the SANDF.

Organisations co-ordinate the work of employees through a hierarchy in which authority is largely concentrated at the top. The hierarchy typically comprises an operational layer, a knowledge layer, a tactical layer and a strategic layer. Managers at all levels of an organisation use information. The characteristics of information required, the method of requesting information, how it is used and disposed, vary from management level to management level. Organisations utilise different types of information systems to address the diverse needs of management inside organisations.

The DOD acknowledges information as a strategic resource that they utilise to achieve their business and military objectives. The value chain of the DOD classifies information as a support defence activity but recognises the existence of information flows (SDI) between all of the activities in the value chain. For information to produce competitive advantage information flows must be established within all environmental elements of organisations. Strategic planning is required to ensure that the resource information is managed over its total life cycle in an effective and standardised way.

The main objective of information management is to satisfy the demand for information and thus add value to the organisation. Information resource management seeks to build up the information assets of an organisation at an acceptable cost to deliver value to the business. Managers at all levels must obtain the maximum contribution from the information in current systems and from information in systems under development. The SANDF supports this methodology because current systems cannot be frozen in time in order to address inefficiencies. A stable integrated information framework delivers benefits and the framework should facilitate a swift response to an unexpected business need.

The commonality between managing information in the private sector and in the SANDF is depicted as the COE (shared). The SANDF must constantly improve the efficiency and effectiveness of their information processes and the ability to respond to unexpected business needs must be developed. This can be achieved by efficient IRM. For IRM to

succeed it must be linked to specific business goals and to the achievement of organisational benefits.

CHAPTER 4

THE CURRENT INFORMATION MANAGEMENT PRACTICES OF THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

4.1 INTRODUCTION

Managers in today's information society rely heavily on information to succeed. Nothing moves without information and it is generally believed that information is power and those who has it have power (Adeoti-Adekeye, 1997: 318). The constant changing business environment has necessitated the need for proper dissemination of information at various levels of management.

A critical component for success in today's business environment is the competent management of the resource information. All decisions made involve, at some level, the management and use of information systems. Managers today need to know and understand their organisations information capabilities as much as they need to know and understand financial resources. Managers who do not understand the basis of managing and using information will battle to be successful in the business environment (Pearlson, 2001: 1-2).

The discipline of information management can be summarised as the organisation's capability of creating, maintaining, retrieving and making immediately available the right information, in the right place, at the right time, in hands of the right people, at the lowest cost, in the best media format for use by all employees and management of organisations. The key issue involved in information management is managing information in an organisation using modern information technologies. Management information and information systems, in particular those related to effective decision-making processes are regarded as valuable organisational resources.

The impact of information management and information technology in the field of government organisations (public sector) are much the same as private companies. Private companies have been exploiting the increasing capabilities of information technology in order to satisfy their customers. The public is demanding the same level of service from government organisations that they have come to expect from the private sector. However, the public sector is deterministically following the same path as the private sector: from the pursuit of efficiency to effectiveness and from the use of information technology by the same old

structures to a complete internal transformation for maximum advantage. The progress towards an information society demands that government not only formulates the appropriate legal and regulatory environment, but also transform themselves into lean and nimble organisations in order to accomplish their governance roles (Stamoulis, Gouscos, Georgiadis & Martakos, 2001: 146-148).

4.2 THE NEED FOR IMPROVED INFORMATION MANAGEMENT PRACTICES

In the South African Defence Force (SADF), secrecy was a way of conducting business and a web of laws restricted access to information. Access to information was a privilege severely circumscribed by a range of laws containing secrecy clauses (Republic of South Africa, 2000b, 2). The arrival of democracy in South Africa has brought about a dramatic reversal of past practices.

The DOD, as one of the largest government departments, is striving to fulfil its constitutional mandates using its resources as efficiently and effectively as possible. The DOD reflects the massive changes South Africa has undergone since the first democratic elections in 1994. Like the country as a whole, its transformation is ongoing and on track. The transformation of the defence function means a change in defence posture, from offensive to defensive. In order to achieve this end, the shape of the Department and its internal workings had to be changed (Republic of South Africa, 2002a: 3).

Civil control over defence has been one of the most important changes. The DOD consists of the Defence Secretariat and the SANDF. The Defence Secretariat headed by the Secretary for Defence is responsible for formulating policy to ensure alignment between the DOD and government policies, the financial administration of the DOD, and ensuring adherence to legislation, government policies, instructions and regulations. In addition, it is responsible for and managing the acquisition of armaments for the SANDF (Republic of South Africa, 2002a: 3). The DOD (including the SANDF) therefore has to adhere to all legislation passed by government.

The SANDF headed by the Chief of the SANDF is the military component of the DOD and is constituted to defend South Africa against military aggression (Republic of South Africa, 2002a: 3). However, in times of peace, as at present, the SANDF performs many other tasks in support of government objectives.

Public sector organisations in South Africa, including government departments, operate in an increasingly litigious community and are expected to account for the quality of their decision-making processes. This is being done not only to satisfy their political masters, but also to prove to their stakeholders that they have produced outcomes in a way that is consistent with their legislative responsibilities (Mccaskie, 1999: 75-77). There is sufficient evidence of a move unavoidably closer to an accountability framework based on compliance with legislation and regulations in the public sector. An integral part of this framework is the requirement to provide clear and unambiguous evidence of how and why decisions are made.

In South Africa this move is facilitated by the PFMA, Act 1 of 1999 as amended by Act 29 of 1999 (Republic of South Africa, 1999) and the Promotion of Access to Information Act, Act 2 of 2000 as emended by Act 42 (Judicial Matters Act) of 2001(Republic of South Africa, 2000b: 2). The PFMA replaces the national and provincial Exchequer Acts and the Reporting of Public Entities Act. Under these acts, financial accountability was undermined because different legislation applied for different entities. The PFMA promotes the objective of good financial management in order to maximise delivery through the efficient and effective use of limited resources. It represents a fundamental break from the past regime of opaqueness, hierarchical systems of management, poor information and weak accountability. The Act laid the basis for a more effective corporate governance framework for the public sector (Republic of South Africa, 1999).

Most governments and government agencies are uncomfortable with the notion of transparency, preferring to operate beyond the glare of public scrutiny. Transparency is a means towards two ends. It aims, first, to promote the accountability of government and, secondly, to promote greater public participation in government (Currie & Klaaren, 2002: 1-3). The SANDF is also moving towards an accountability framework based on transparency and compliance with legislation and regulations.

The Promotion of Access to Information Act gives effect to the public's right of access to information that is required for the exercise or protection of any right as contained in the Constitution of the Republic of South Africa (Section 23 of Act 108 of 1996). Both private and public bodies are under a duty to provide access to requested information, or part of it, unless refusal of the request is permitted or required by the Promotion of Access to Information Act (Currie & Klaaren, 2002: 1-3).

According to the Preamble of the Promotion of Access to Information Act (Republic of South Africa, 2000b: 2), the Act is intended to foster a culture of transparency and accountability in public and private bodies. This is achieved by empowering members of the public to effectively scrutinise and participate in decision-making by public bodies. Generally, the Act aims to promote effective governance.

One of the declared objectives of the Promotion of Access to Information Act is to limit the constitutional right of access to information in order to protect other fundamental rights and important aspects of the public interest. The limitations are aimed at the reasonable protection of privacy, commercial confidentiality and efficient and effective governance. The DOD may refuse requests for information in terms of section 41 of the Promotion of Access to Information Act (Republic of South Africa, 2000b: 2). Even if requested information is covered by one or more of the grounds for refusal as stipulated in section 41 of the Act, the DOD must disclose the requested information where the context of the information reveals a breach of law or public safety or environmental risk and where the public interest in disclosure outweighs the harm that disclosure will cause (Currie & Klaaren, 2002: 100).

If public sector managers and managers in the SANDF are going to be more accountable, relevant information must be provided to assist them in decision-making. Improving the information management policies and information systems of organisations can provide this type of information. Improving the quality of information available to managers will be a crucial aspect of implementing the PFMA (Republic of South Africa, 2002a: 4).

The key objectives of the PFMA are summarised as (Republic of South Africa, 1999): modernise the system of financial management; enable public sector managers to manage, but at the same time be more accountable; ensure the timely provision of quality information; and eliminate waste and corruption in the use of public assets. It is important to note that the aim of the PFMA therefore is to improve the principles of management in the public sector in general and do not solely focus on the improvement of financial management. To achieve this, the principles of management for public sector organisations must be reviewed and improved accordingly.

From the above discussion, it is clear that the Promotion of Access to Information Act and the PFMA both aims to promote effective governance (Republic of South Africa, 2000b: 2). The Promotion of Access to Information Act will be a burden to organisations that do not have comprehensive end effective information management. Ideally, the ability to comply with the Act should be a spin-off of good information management policies and systems. Good

information management policies and systems will assist organisations to comply with the regulations as stated in the PFMA because the quality of information available to managers and decision-makers will improve (Currie & Klaaren, 2002: 100). Complying with the Promotion of Access to Information Act therefore will assist the SANDF to comply with the PFMA.

According to Renken & Marais (2002: 1), the question of public access to defence information in a democracy in a time of peace is inevitably characterised by a tension between the imperatives of transparency and accountability on the one hand, and the legitimate need to preserve the confidentiality and secrecy of certain information on the other. An integral part of this framework is the requirement to provide clear and unambiguous evidence of how and why decisions are made. The structure, information systems and information practices of the SANDF will be discussed to determine whether the existing information management practices and systems of the SANDF can provide management with the required information for decision making and proper control (Republic of South Africa, 2000a) and have the ability to comply with the Promotion of Access to Information Act.

4.3 THE STRUCTURE OF THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

Before transformation in 1997 the SANDF business activities, organisations and subsequently information systems were primarily identified from a functional perspective. A functional orientation implies that the activities are focussed on the object of a process as opposed to the process itself. The focus was placed on the resources, and not the processes, required to deal with the resources. The management provisioning and support of the various resources was viewed as unique regardless any commonality that may existed. Although operations represented more of a process orientation it focussed on types of operations with a disregard for any commonality between types of operations (Republic of South Africa, 2002b: 38).

Because of this functional perspective, the structure of the SANDF was centralised and power orientated. The SANDF functioned according to these structures with four independent Services that acted in an independent manner resulting in limited communications between the Services. The SANDF was structured as explained diagrammatically by Figure 4.1 in independent vertical silos consisting of the SA Army, SA Navy, SAAF and Surgeon General (Cumming, 2001). The most prominent functions within these silos were personnel, intelligence, operations, logistics, and finance (Cumming, 2001).

The respective Services were responsible to execute their own planning within the vertical silos. The planning function (DOD level 2) and execution functions (DOD levels 3 and 4) were not separated from each other (Craig, 2001).

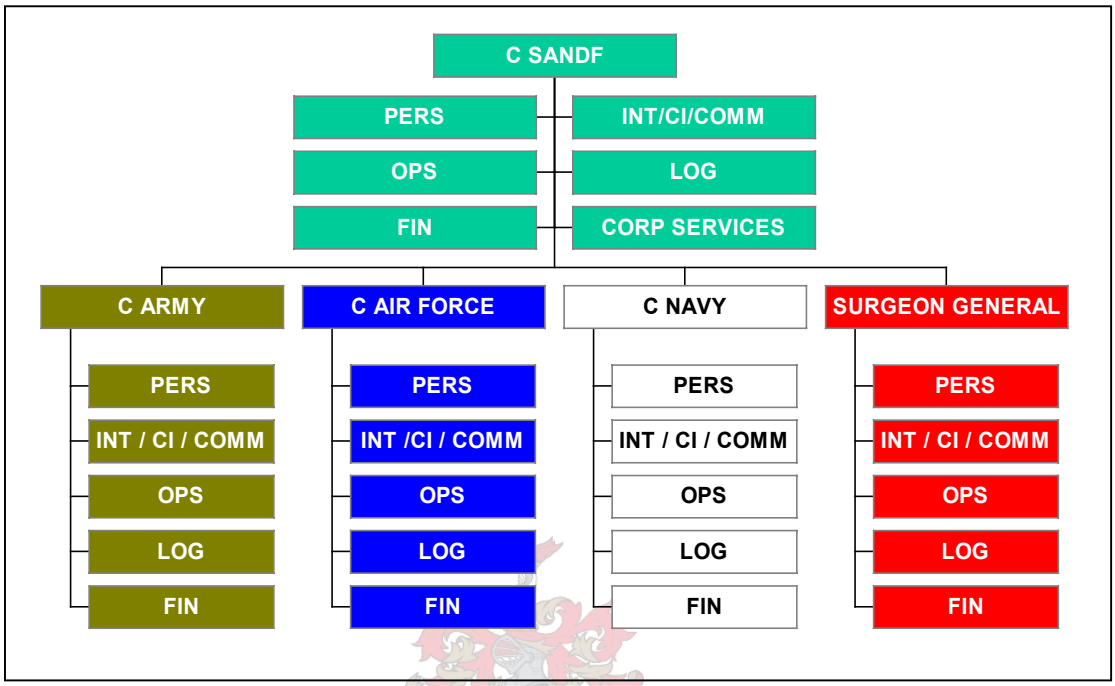


Figure 4.1: The Structure of the SANDF before Transformation (Adapted from Craig, 2001).

One of the DOD transformation principles was to separate the planning function from the execution function (Cumming, 2001). In adherence to this principle, the SANDF after transformation is restructured into a more integrated forces concept illustrated by Figure 4.2. The present organisational structure of the SANDF is a more flat structure suggesting emphasis on co-operation, joint planning and operations.

The Services was restructured in the following way: the personnel and logistics functions were restructured under Joint Support Division; the operational function was restructured under Joint Operations Division and the finance function was restructured under the Secretary for Defence known as the Finance Division. Command Management Information Division is responsible for providing an information management and utilisation capability to the SANDF. The Services in co-operation with Defence Intelligence must execute the intelligence function (Republic of South Africa, 2002a: 36-41).

The logistic organisations of the SANDF before 1997 were structured on the same principles as the different Services. The Services were responsible to execute their own logistical

function and consequently had their own level four logistic organisations responsible for policy and procedures. The level four logistics organisations were structured under Chief Staff Logistics (CSL). The Services were solely responsible to support their units logistically. Figure 4.3 illustrates the logistical organisations of the SANDF before the implementation of the GSB concept.

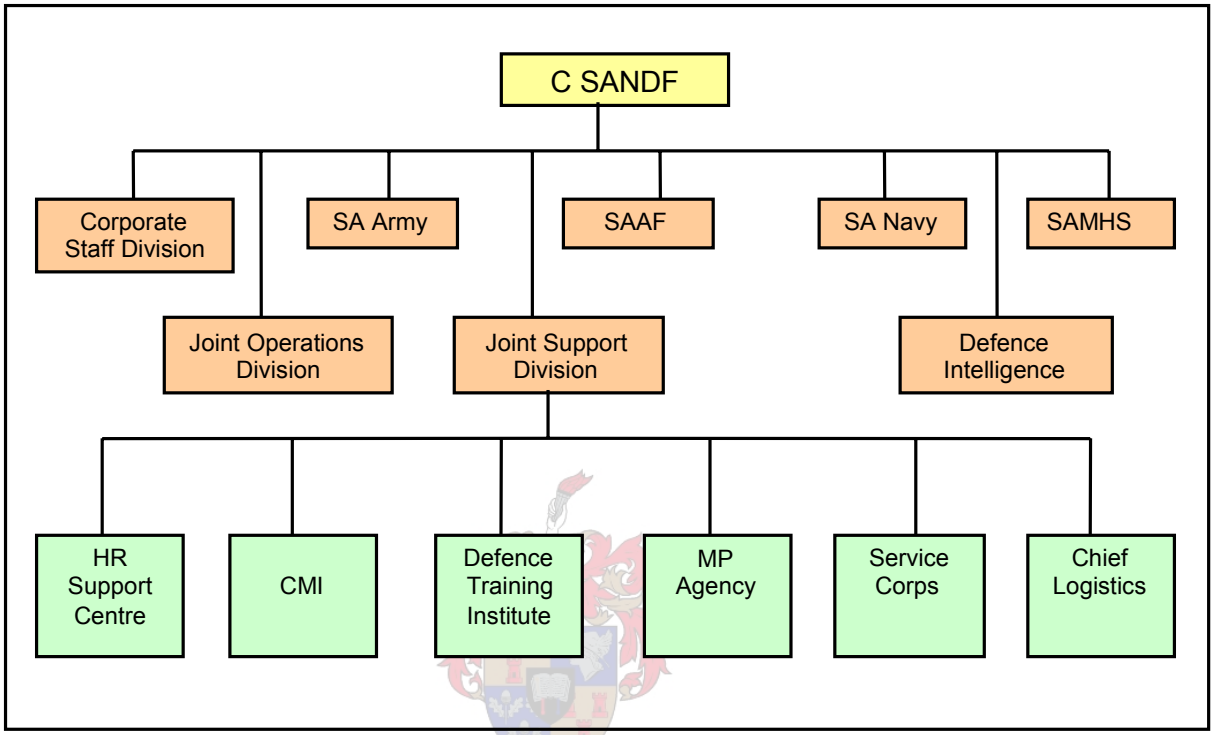


Figure 4.2: The Structure of the SANDF after Transformation (Adapted from Republic of South Africa, 2002a: 36-41).

This resulted in the development of different logistical support systems within the SANDF. Although each Service developed their own logistical support system, the structures of the logistical support systems of the respective services were similar (Craig, 2001).

After transformation, the logistic picture of the SANDF changed drastically. As part of the transformation and redesign of the DOD, it has become apparent that a base structure must be formulated to ensure that the main core business of units will not be hampered or impaired by the support function. This support structure has given rise to the GSB concept to ensure common support to all units within its designated area (Department of Defence, 1998: 2).

Subsequently the level four logistic organisations were taken away from the Services and grouped under C LOG, suggesting a flatter organisation structure as explained by Figure 4.4.

With this restructuring, the responsibility of determining logistic policy and procedures and the sole responsibility to support their units logistically was taken away from the Services. The Services will remain responsible for system and product management as well as their core business. The responsibility of determining logistic policy and procedure now solely rests upon C LOG (Craig, 2001).

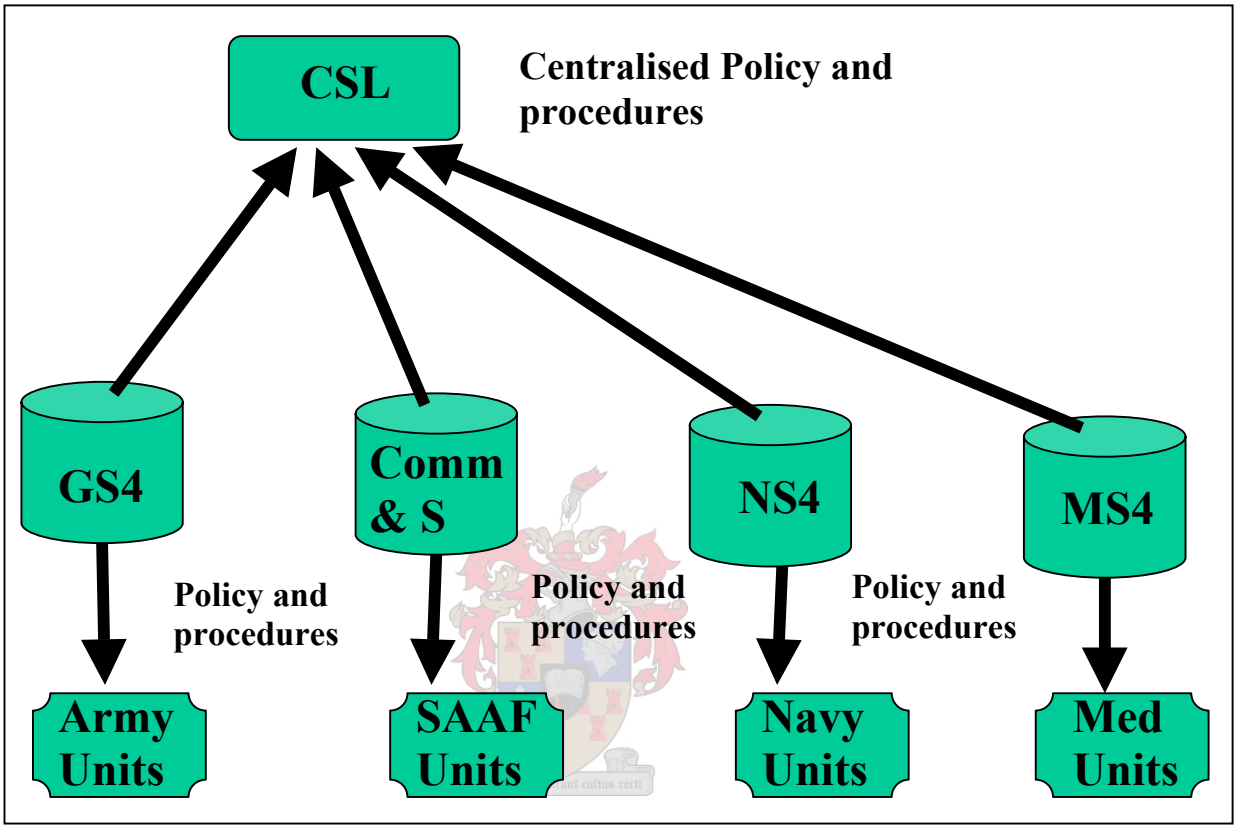


Figure 4.3: The Previous Logistical Organisations of the SANDF (Craig, 2001).

The transformation of the logistic system will have an influence on the way in which the SANDF will support its forces in the future (Snyman, 1998: 1). The logistical support system of the DOD must have the ability to support all of the forces of the SANDF (Craig, 2001). The C LOG and the newly established support bases will now execute the level four logistical functions. This should lead to a reduction in costs and an improvement in logistical effectiveness (Cumming, 2001).

Illustrated by Figure 4.4 are the functions of the support bases inside the respective Services namely accounting, warehousing, distribution, disposal administration and codification. It is important to note that units will now be known as FSE's. The newly established support bases are responsible for the following general services towards the different FSE's inside

their area of responsibility (Craig, 2001); security services, counter intelligence, common training support, physical training, sport and recreation, and logistics services.

The following logistic services must be provided by the support bases to the respective FSE's (Craig, 2001): Facilities management, facility maintenance, environmental services, procurement, general commodities and materials, stores administration, transport administration, hospitality services, warehousing and technical support.

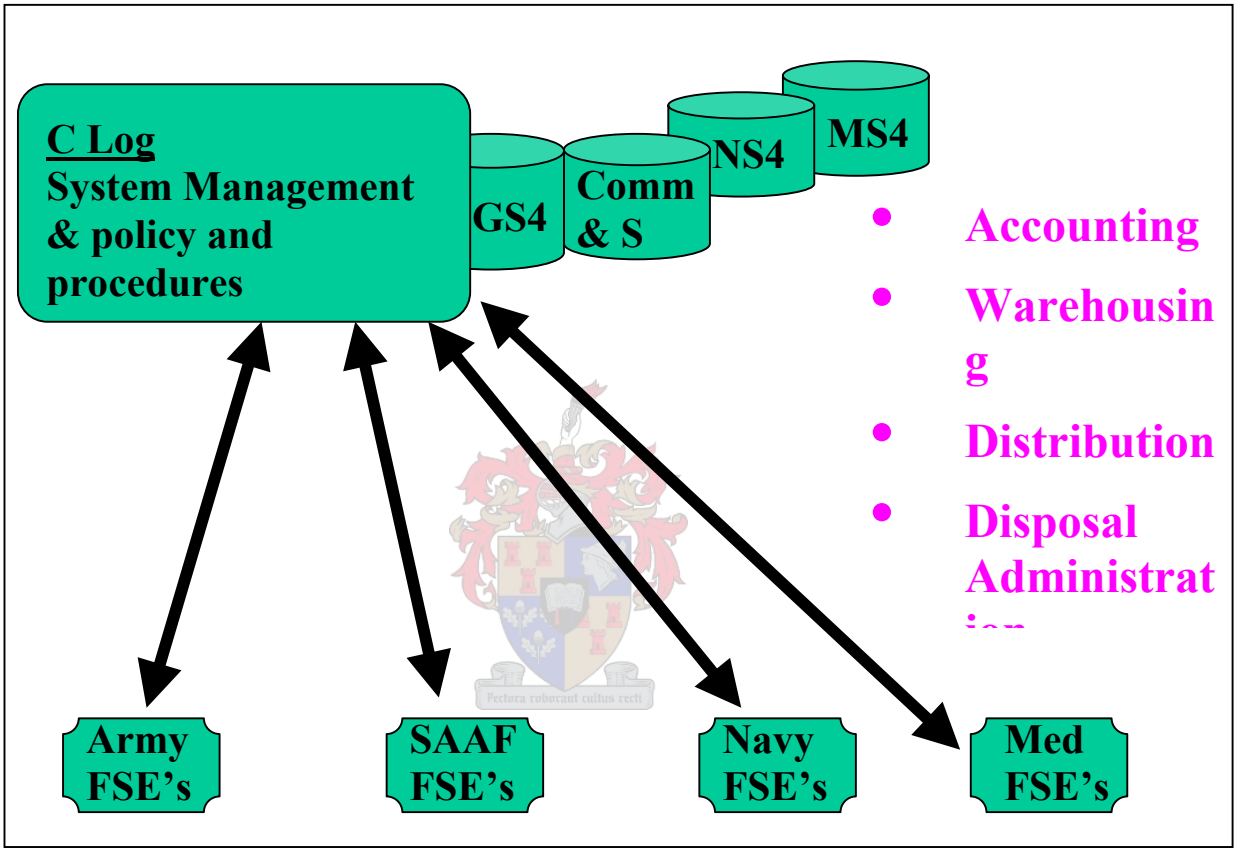


Figure 4.4: Responsibilities of Chief of Logistics under the New Logistical System (Adapted from Craig, 2001).

The responsibility of stock administration rests upon the support bases (Cumming, 2001). The support bases are self-accounting, but the FSE's that they support are not. The result is that the FSE's under control of a support base cannot be self-accounting. The support bases are responsible for the accounting but the FSE's commanders remain accountable for the stocks under their command (Craig, 2001). Regardless of the Service the FSE's belongs to, the support bases must provide these services. In some circumstances, a SA Army support base must provide services to SAAF, SA Navy, SA Army and SAMHS, FSE's. These service requirements place pressure on the logistic information systems of the SANDF.

As information systems naturally follows business activities it is logical that the current information systems of the SANDF are functionally orientated and that functionality and data are duplicated within these systems. The current information systems in use in the SANDF will now be addressed to illustrate the functional orientation of these systems (Republic of South Africa, 2002b: 26-28).

4.4 THE EXISTING LOGISTICAL INFORMATION SYSTEMS IN THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

The pre-transformation structure of the SANDF (before 1997) as illustrated by Figures 4.1 and 4.3 resulted in the different Services developing their own logistical information system. The end result today is more than one system in operation in the SANDF namely CALMIS used by the SA Army, OSIS used by the SAAF and the SA Navy, with the SAMHS still using the first systems in the SANDF namely the Depot Information Management Systems (DIMS) and the Unit Inventory Management System (UIMS) (Holder, 2001).

The OSIS was developed by the SAAF with a "top down" approach for the purpose of management information. In the initial phases, the system did not focus on first and second line stock management but enabled the SA Navy and SAAF to move from a state of push to pull logistics. The optimum utilisation of the system results in effective operations support, which ensures analysis of operations and effective management of operations in progress (Bouwman, 2001).

The SA Navy and SAAF processes are comparable and therefore the systems used by them are compatible and can interface with each other. The OSIS has enabled the users of the system to utilise the system in a totally integrated fashion, ensuring visibility of life cycle cost. The OSIS consists of the material management system, vehicle management, maintenance management system and the configuration management system (Bouwman, 2001).

In the SA Army, the CALMIS is utilised. The new logistics environment of the defence force obliges the FSE's to communicate with the support bases for logistic support. The FSE's must only have the ability to request and receive stock because the responsibility for stock administration lies at the support bases. Therefore, only support bases will require an information system for stock administration. This is called the "multiple-unit per instance" concept and it is estimated that software will be more cost effective within the GSB environment. The capacity of the system is currently sufficient to support the logistic needs required by the GSB concept (Coetzee, 2001).

The CALMIS was developed for the management of first and second line stock levels. The management information aspects did not receive attention up to date, but with the correct guidelines and funding is must be developed. The CALMIS consists out the following integrated sub-systems (Coetzee, 2001): material management system; shop floor scheduling and control system; transport system; force structure management system and weapon systems manager system. The problem facing the SANDF is that managers cannot agree on the type of management information that is required from the systems output.

The SAMHS is still using the first systems in the SANDF namely DIMS and UIMS on the mainframe of the SANDF. With the ageing DIMS and UIMS the legacy corporate logistics systems effective life span is no more than a few years. If DIMS and UIMS are not phased out in the next two years, an interface to these systems will have to be developed. The Service that has not phased out DIMS and UIMS by the beginning of 2004 will have to fund the development and maintenance of the interface themselves (Holder, 2001).

The move to an accountability and responsibility framework in the public sector of South Africa compel commanders in the SANDF to account for the quality of their decision-making processes (Republic of South Africa, 2002a: 4). The Logistic Executive Information System (LOG EIS) was developed to provide integrated logistical information to commanders and managers in the DOD who have to manage a logistic component as part of their mandate. The LOG EIS is an extensive EIS that covers all critical aspects of the management of the logistic environment. The original application only reported on mainframe based data. Unfortunately, most of the DOD logistical data is generated by CALMIS and OSIS. The success of the application resulted in the successful acquisition of data from CALMIS and OSIS and today this data is incorporated in the reports generated by the system (Haasbroek, 2002).

Unfortunately, the reliability of the information that the system provides is in question. The reason is that data received from OSIS can be manipulated because OSIS make use of its own data warehouse. Currently only limited information is received from CALMIS. One of the shortcomings of the system is that the continuous upgrading of the data does not take place. Data is only updated on a monthly basis. The correctness of the monthly-summarised data received from the respective systems is therefore questionable. In spite of existing problems, the system is already a usable tool for managers to assist them in the management of their logistical environment (Koch, 2002).

4.5 THE LOGISTIC EXTERNAL INTERFACES OF THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

Irrespective of which Service FSE's belong to Support Bases must provide logistical support within its predetermined area of responsibility. For effective logistical support, the logistical systems of the FSE's must have the ability to communicate with the logistical system of the support base providing logistical support to them. Unfortunately, the current logistical systems of the SANDF use different software applications and the processes of the systems differ making them not compatible with each other (Cumming, 2001).

The difficulties in compatibility and data inconsistencies that exits make it nearly impossible for the logistical systems to support the GSB concept. The new requirements that are expected from the logistical systems with the implementation of this concept are immense (Cumming, 2001). A brief discussion of the most important logistical interfaces is provided to highlight the functional orientation of the logistical systems of the SANDF. Figure 4.5 illustrates the logistical external interfaces in the SANDF.

The existing logistical information systems (CALMIS, OSIS, DIMS and UIMS) provide information to the Corporate LIMS on the mainframe of the SANDF. Emphasis must be placed on the fact that CALMIS, OSIS Navy and OSIS SAAF are decentralised systems and operate independently but are linked to the mainframe of the SANDF. The UIMS and DIMS are situated on the mainframe of the SANDF. Currently the only decentralised logistical system that can interface with UIMS is CALMIS. The DIMS are linked to CALMIS, OSIS Navy and OSIS SAAF, but unfortunately only the DIMS ammunition subsystem is linked to CALMIS (Holder, 2001).

4.5.1 The Corporate Logistical Information Management System

The corporate LIMS on the mainframe of the SANDF is divided into Item Identification (II) LIMS A, II LIMS B and II LIMS C as illustrated by Figure 4.6. Medical Item Identification (MII), Army Item Identification (AII) and Navy Item Identification (VII) is DOD computer centres used to store the support databases for the functioning of the National Codification System (NCS). The decentralised logistical systems cannot interface with Armscor, but the mainframe does have the ability (Holder 2001).

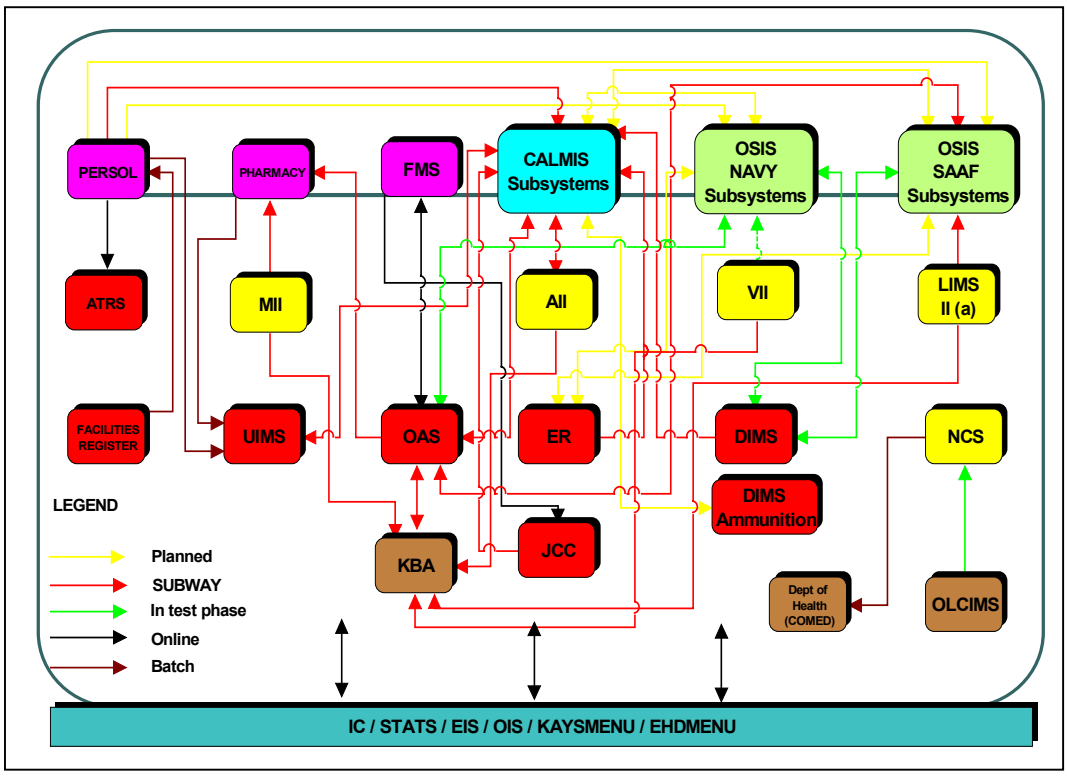


Figure 4.5: The Logistical External Interface (Adapted from Holder, 2001).

The other corporate logistical systems that are used are the Equipment Register (ER) on the mainframe of the DOD, which is the statutory register of all weapons and vehicles in the DOD. In addition to ER, the CALMIS and OSIS systems also maintain registers of these assets. Unfortunately, currently no link exists between the OSIS system and ER, while the link between ER and the application of CALMIS is a constant source of problems and out of step data. The result of this is that the vehicles and firearms register of the DOD is not accurate posing a constant risk to the DOD (Beverley, Crabtree, van Biljon & Vosloo, 2002: 4-5).

The Order Administration System (OAS) is another application in corporate LIMS, which is installed on multiple DOD computer centres with a mirror of order header data kept at another centre for the financial system to access. An out of step situation exists between OAS and CALMIS, and OAS and OSIS (Navy and SAAF) with regard to the reference between the dues-in that are created and maintained on CALMIS and OSIS versus the orders that are created and maintained on OAS. This problem has developed over time because OAS is a mainframe-based system and CALMIS and OSIS are non-mainframe systems and little validation is done to ensure that the data corresponds (Beverley, et al., 2002: 5). These multiple copies of the OAS, as well as the interfaces causes more and more

out of step problems as the Services are forced to move towards one ordering platform in the GSB concept.

Currently the DOD manages the NCS on behalf of the National Codification Bureau (NCB). The corporate NCS is in the process of being partially replaced by a new NCS, the Online Cataloguing Information Management System (OLCIMS). When the new system is implemented, the functionality of the current system will be reduced so that it will only serve as the Corporate Item Identification (CII) system of the DOD. The CII system will be the only II source, replacing all creation and maintenance functions in the II and NCS of corporate LIMS, CALMIS II and OSIS II. The CALMIS, OSIS and corporate LIMS programmes will be required to modify its systems to use CII for all item data creation, maintenance and enquiries (Beverley, et al., 2002: 5-6).

The current Facility Register System (FRS) does not cater for the additional requirements regarding facilities management (accrual accounting principles) placed upon the DOD by the PFMA (Republic of South Africa, 1999). Various constraints and shortcomings regarding interfacing exist. The FRS cannot interface currently directly with “Personeel en Soldy” (PERSOL) system or provide a link between facility maintenance and CALMIS/OSIS Job Card Subsystem (JCS). The FRS and the Department of Public Works asset management system is also not linked (Beverley, et al., 2002: 6).

4.6 THE CURRENT PHYSICAL DESIGN OF THE INFORMATION SYSTEMS OF THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

The information systems of the SANDF evolved over an extensive period within the functional orientation of the SANDF before transformation (Figure 4.1). This resulted in the use of different technologies, which makes the sharing of functionality and data troublesome (Republic of South Africa, 2002b: 26-28).

4.6.1 The Other Mainframe System of the South African National Defence Force

Corporate systems are systems generally used by all or at least more than one division of the DOD, but which have a specific functional owner (Haasbroek, 2002). The following mainframe systems of the SANDF (Figure 4.6) are all corporate systems: PERSOL; Financial Management System (FMS); Organisation Information System (OIS) and Health Informatics System.

The undisputed system owner of PERSOL is Chief Personnel. The system is used for the day-to-day management of personnel aspects of the DOD. A large number of reports can be generated by the system. A few examples of reports that can be generated by PERSOL are the residential areas of members, rank and appointment codes and administrative pay point of members (Thomas, 2002).

The FMS in use is based on cash accounting principles, but has the ability to show the expenditure data of the different FSE's up to eight years back. The budgets for the next two financial years can be saved on the FMS. Distribution codes regulate access to budget information. The different budget managers of the SA Army, SAAF, SA Navy and SAMHS restrict access to the budget information of their respective Service and the result of this restriction is that integrated budget reports cannot be produced with the FMS. The functionalities of the FMS allows for integrated reports but the strong emphasis placed on data ownership by the Services stop these integrated reports form being generated by the system. Unfortunately the systems at this stage cannot process multiple financial objectives. Currently integrated and multiple financial objective reports must be generated by hand, which is a time consuming exercise (Naude, 2002).

The OIS was designed to support the structure of the SADF (Reach, 2002). Currently the system is not adapted to support the business processes of the new SANDF. Organisational information of all entities that belong to the DOD from military units to state departments is stored on the system. The OIS defines the role and functions of these entities (Reach, 2002).

The Structure Management Control system (SMCS) is part of OIS. The SMCS provides the hierarchy and command affiliations of the SANDF. However, no link is provided with the logistical and financial systems. Force numbers does the placement of members on the hierarchy. The force number is attached to a post and can be cross-referenced with PERSOL to determine the validation of the force number. Currently this data cannot be used to verify and evaluate financial transactions (Reach, 2002).

The SAMHS information system is commonly known as the Health Informatics System of the SANDF. The Pharmacy system is a functional sub-system of the Health Informatics Systems of the SANDF specifically designed to address the needs of the SAMHS. Because of this, the system is the responsibility of the SAMHS, regardless of the fact that it is a logistical system (Trichard, 2002). The Pharmacy system provides timely statistics direct from the mainframe. Examples of these statistics are reports about admissions to hospitals, out of

hospital transfers, deaths and discharges. These reports are consolidated on the SAMHS Executive Information System (SAMHS EIS). The results are published on the Intranet of the DOD. The system is a specialised system, specifically designed to address the needs of the SAMHS and because of this, the system is the responsibility of the SAMHS, regardless of the fact that it is a logistical system (Vivier, 2002).

It is clear that the mainframe of the SANDF can interface with the decentralised logistical systems and with Armscor. These interfaces are made possible by Message Orientated Middleware (MOM) that sits between the application and network communication mechanisms. It creates uniform mechanisms for application integration independent of network and platform technologies (Needham, 2002: 69). The MOM used by the SANDF to affect these interfaces is called MQ series links. The FSE's currently can only communicate with the specific logistical system to which they are linked (Holder, 2001). The current physical design of the information systems of the SANDF is portrayed by Figure 4.6.

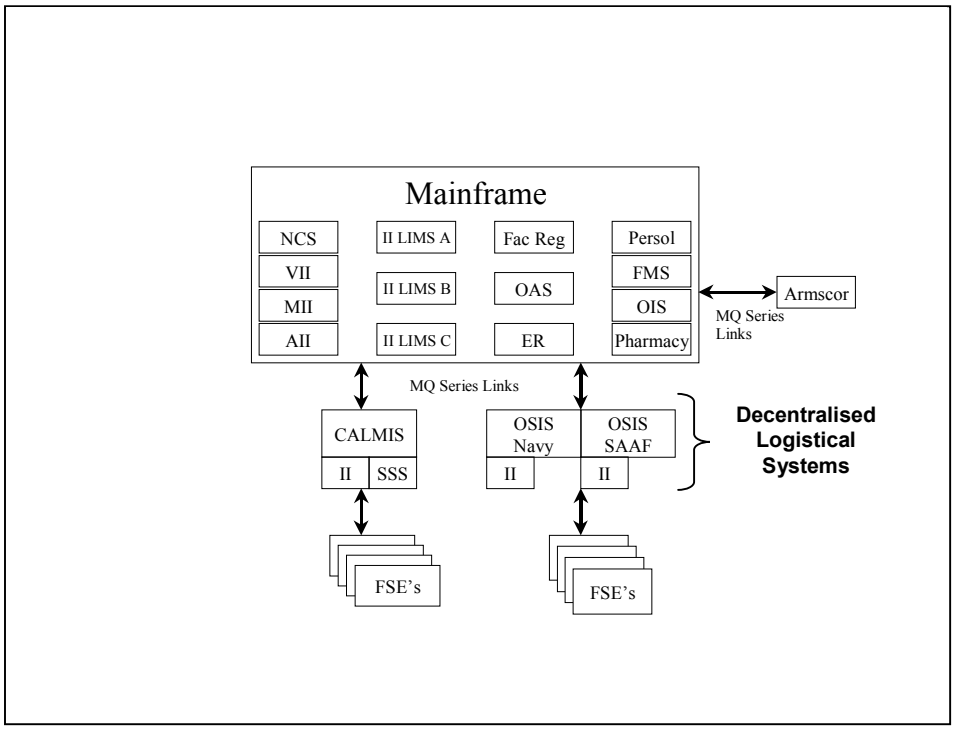


Figure 4.6: Current Physical Design of Information Systems in the SANDF (Holder, 2001).

4.7 INFORMATION MANAGEMENT SERVICES IN THE DEPARTMENT OF DEFENCE

The Information Management Services (IMS) department provides an information management service, which stems from the need of the DOD to manage corporate information and to make it available to DOD commanders and decision-makers. Historically

IMS focussed on the management of structured corporate data that was contained in different traditional transactional databases, in particular the Information Centre (IC) on a mainframe Focus database and the transitional Data Warehouse (DW) on an Oracle database (Haasbroek, 2002).

4.7.1 Historical Overview

In 1984, Infoplan decided to start with the development of the IC since most of the SADF computerised systems ran on the mainframe (Haasbroek, 2002). The IC was started with data from the FMS and currently most of the mainframe systems have been brought on board. Distributed systems like CALMIS and OSIS never had data replicated to the IC. This resulted in an incomplete view as far as logistical data is concerned. Project LOGEYE was the first step towards bringing together data from both IC and distributed systems in the logistical environment. To accommodate the different systems in use with different data formats in the SANDF the DW was established. It started with data in data base files on file servers all over the country and resulted in the DOD transitional DW (Haasbroek, 2002).

Today the IC still provides the data and interactive environment enabling users to write their own programs or access structured information reports. The IC Shell provides authorised users with the ability to request management information in the form of ad hoc reports by writing their own programs to access the information. It reaches a much wider user group through IMS SAVINFO and any non-IC user can request an IC program.

The aim of IMS SAVINFO is to have standard structured business information for the DOD qualified on all levels and to improve productivity. IMS SAVINFO provides standardised structured operating information in the form of reports to the users. Registration on IMS SAVINFO is open to everybody in the DOD who meets the stated requirements (Thomas, 2002). The SMCS of the SANDF is also linked to the SAVINFO database. The data warehouse currently hosts data in support of the reporting applications like LOG EIS, Costing Tables, Swift Human Resources (SwiftHR) and SAMHS EIS (Haasbroek, 2002).

The data in the DW is centralised on an Oracle database and is accessed by the reporting applications that are client server or web based. The logistical data is collected from corporate LIMS (via the IC), CALMIS and OSIS. External sources and mainframe systems from the IC supply the costing table's data. The HR and SAMHS data is extracted from the IC. The data is structured dimensionally to enable efficient querying and a single copy of

conformed dimensions and shared data is maintained to ensure data integrity through a single source of data. The current situation is explained graphically by Figure 4.7.

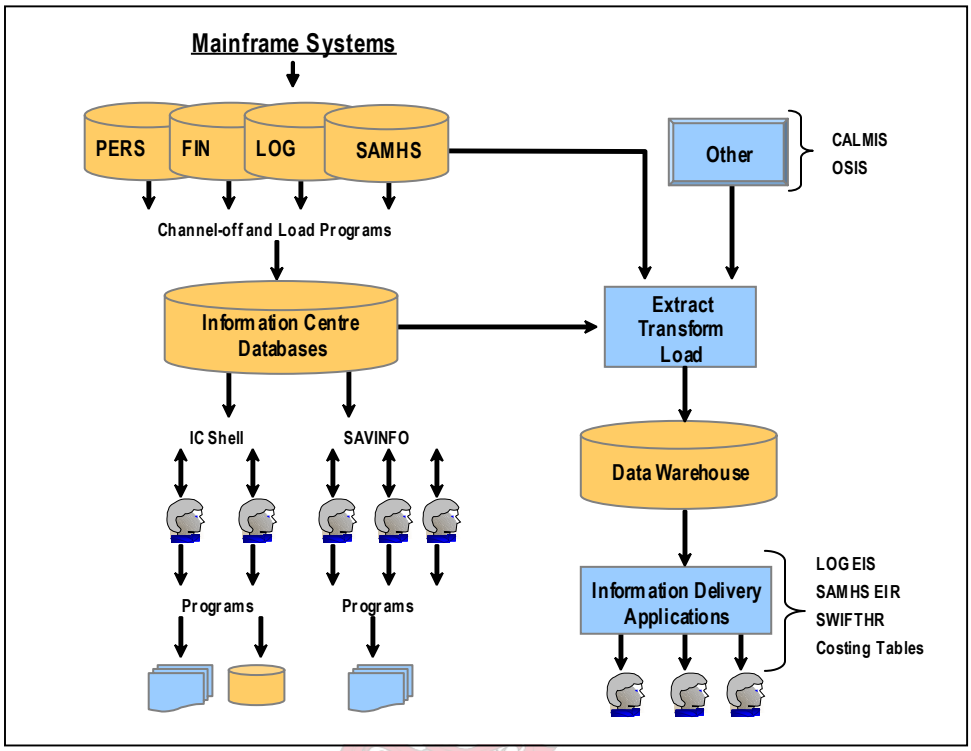


Figure 4.7: Current Information Management Services (Adapted from Haasbroek, 2002).

4.7.2 Current Information Management Services in the South African National Defence Force

Over the past year (2002), the transitional DW of the DOD has been stabilised mainly through the acquisition of dedicated infrastructure to support the DW environment. The IMS widened their scope to provide a bigger range of information. This includes the provision of unstructured information through the information management infrastructure. The focus of the support services shifted from the do-level structure of the organisational triangle to the decide-level structure while maintaining the do-level through increased automation. Information management was recognised as a critical tool for organisational success. It is imperative that organisations elevate information management to a strategic level. Subroven and Marias (2002: 7-8) found that information management enables the DOD to make sense of the business; measure performance, projects and operations; improve relationships among stakeholders in the information user community; and create an opportunity to save cost and to improve the level of accountability in the SANDF.

The IMS that are provided currently are divided into five main categories namely: DW services, information delivery services, IC services, ad hoc information management services, and training services.

4.7.2.1 Data Warehouse Services

The DW services are aimed at managing the infrastructure for Information Management. The return on the investment of the DW is therefore in efficiency and flexibility. During the past year, the hardware and software infrastructure for the transitional DOD DW was established, and the service stabilised to become reliable and predictable. The DW is currently accessible to authorised users from 8:00 am to 5:00 pm. The latest data is also available on the DW within the restrictions of the current systems that exists (Subroven & Marias, 2002: 11-12).

4.7.2.2 Information Delivery Services

The information delivery services are aimed at managing the information delivery applications. The return on the investment of the information delivery lies therefore mostly in effectiveness. These services focus on the accessibility of the application server and the provision of ongoing technical support and maintenance on the application server infrastructure as necessary. Information management services must also provide technical support to functional application support staff for the maintenance of all approved information delivery applications or systems as requested through the Action Request system (ARS) for corrective maintenance, adaptive maintenance and other minor enhancements. The ARS is used to report all defects/problems on all information systems of the DOD. Lastly, second line tactical support must also be rendered on the existing SAAF information management system (OSIS) (Subroven & Marias, 2002: 13-15).

4.7.2.3 Information Centre Services

The IC services stems from the need to manage and maintain the legacy domain of information management. The IC is a well-established, stable environment residing in the mainframe environment of the DOD. It is well integrated with the mainframe based transactional systems of the DOD. The IC is still the primary source of mainframe based corporate information that originates from corporate LIMS, SAMHS, PERSOL, FMS, and OIS/SMCS. The IC services involve both storage-related services and information delivery or reporting services. The IC shell and SAVINFO facility is available from 8:00 am to 5:00

pm, and provision is made for necessary maintenance when needed (Subroven & Marias, 2002: 9).

The current OIS/SMCS data available on the IC is inadequate. Furthermore, there is no guarantee that the available data is correct. The OIS/SMCS data is critical corporate reference data that should be useable for any reporting that requires an organisational view. This data is passed on to the DW where it becomes a critical dimension for organisational reporting (Haasbroek, 2002).

4.7.2.4 Ad hoc Information Management Services

This category of services mainly involves strategic direction giving and policymaking issues of information management. It includes services that cannot be associated with the other four service categories. Information management is essentially a strategic initiative. The infrastructure that is required for a basic information management service pertaining to structured information from the transactional systems only forms the foundation of the information management framework. Through the inclusion of strategic direction giving and policy-making services, the IMS is able to ensure alignment of the information management goals of the State Information Technology Agency (SITA) and the DOD. The DOD strategy regarding information management is not addressed in any documentation, either explicitly or implicitly. However, guidelines do exist to direct and launch strategic information management initiatives (Haasbroek, 2002).

4.7.2.5 Training Services

Traditionally, information management training was focussed on the IC and IC related matters. Due to the nature of the IC, the supporting services and the information that is contained in it, the target population for training was restricted to members of the DOD with a particular functional profile and technical abilities. Information Management Services is planning a shift in the training services, but at present, the status quo regarding IC training will be maintained in support of the do-side level services, activities and clients. The focus will be to narrow the gap between IC and DW related information application training. These training activities need to be investigated and planned for in the information management services functional application support environment (Subroven & Marias, 2002: 9).

4.7.3 Strategic Business Advice Service

The provision of an integrated information service to decision-makers and commanders in the DOD is long overdue and it presents a business opportunity. To exploit the business opportunity CMI Division has requested IMS to render a Business Advice Service (BAS). This service will render a functional support service to level 0-3 managers in the DOD to address the business needs of the DOD.

The majority of Strategic BAS resources are contractors with specialised skills and experience in the definition of performance measurement instruments. Strategic BAS will provide the following services (Marais, 2002: 6):

- Advice and consultation services to the clients of CMI Division regarding performance measurement indicators and instruments as prescribed or defined by Director IMS;

- Identification, analyses and formulation of information requirements of strategic level DOD managers;

- Advice and assistance to CMI Division regarding the prioritisation and realisation of the information needs of the DOD;

- Technical and functional support and advice to other members of the IMS team regarding the existing BAS domain of expertise.

The primary objective of this service is to support strategic level management in the DOD and related entities in solving business problems relating to the performance of the DOD and its divisions against its business plans. In this regard, the service is aligned with the first and third processes of the Strategic Direction (SD) process of the DOD (Coetzer, 2002).

The secondary objective is to contribute to the creation of an environment where all business advice within the DOD can be co-ordinated, synchronised and formulised thereby optimising the support and related cost. To achieve this objective Strategic BAS will work closely with the technical and functional teams of IMS. Strategic BAS will set up, utilise and maintain a requirement repository that contains and structures the strategic needs and requirements of the DOD. The Strategic BAS will co-ordinate similar business advice services in other directorates of the DOD. Similar services in the DOD must be identified and liaison for future co-operation and co-ordination must be established. In the future Strategic BAS will co-ordinate and direct all similar services in the DOD. Similar services delivered to or by public and private organisations must be evaluated (Marais, 2002: 5-6).

4.8 INTEGRATED FORCES AND INTEGRATED INFORMATION SYSTEMS

In contrast with its previous isolation, the SANDF now forms part of a larger defence community with new challenges and opportunities, which necessitates a new approach to sub regional defence. The New Partnership for Africa's Development (NEPAD) will challenge the SANDF to contribute to the success of these initiatives. The SANDF Force Employment Strategy is based on the following (Republic of South Africa, 2002a: 5-6):

- A multinational approach aimed at the establishment, structuring, staffing, equipping, operating, exercising, sustaining and empowering of sub regional structures to foster security;

- An interdepartmental approach designed on improving co-operation;

- All operations will be executed with a joint or multinational mission trained task force comprising capabilities of all the services and divisions supported either by or in support of other role players.

It is therefore imperative that a focussed effort should be maintained to co-ordinate all projects relating to the improved missions, to provide cost-effective solutions. The availability and access to the right information at the right time is critical for managers and commanders in the SANDF. For a commander or decision-maker (operating in the joint environment) to obtain essential information, information must be sourced from, processed and communicated across system boundaries.

As management information became more important, the SANDF was faced with the choice of developing new information systems or the development of MIS. The DOD already invested large amounts in the current information capabilities and the re-development of the information systems of the DOD was never seen as an option. This led to the development of complex MIS mainly the responsibility of CMI Division. To cater for the inadequacies of current systems, integration and the availability of management information could only be achieved with complexity. This complexity does not really resolve the problem, because special skills and capabilities are constantly required to obtain information. As the situation matures and users of information demand more, the inadequacies of current systems will become even more apparent (Republic of South Africa, 2002b: 26-28).

The SANDF until recently did not accept management as a process. Management activities before transformation were identified from a functional perspective implying that the activities of the SANDF were focussed on the object of the process as opposed to the process itself. Management was acknowledged as present but the underlying activities were never made visible as to clearly identify information requirements. It is most probably because of this fact that functional systems were focussed on the transactional requirements, as these areas seemed to benefit most by computing power. When management as a process emerged, it required functionality and data that the current transactional systems could not provide (Republic of South Africa, 2002b: 39).

In Figure 3.2, the process approach towards organisation structuring is illustrated and the high-level business processes of the DOD are shown. Subsequently the DOD must adapt a process orientation as a principle for information system design. The implications of these decisions are generally unclear or contextually misconstrued. Function and process represent different sides of the same coin and organisation represents a different view altogether. Any viewpoint in between represented a hybrid of functions, processes and organisation. The relationships (similarities / differences) between function and process in the SANDF are illustrated by Figure 4.8.

Direct the DOD	Provide Defence Resources	Prepare Defence Capabilities	Employ Defence Capabilities	Support Defence Activities	Functions
X	X	X		X	Personnel
X			X		Intelligence
X		X	X		Operations
X	X			X	Logistics
X				X	Finance
X					Planning

Figure 4.8: Relationship between Function and Process in the SANDF (Republic of South Africa, 2002b: 40).

The significance of the relationship in respect of information systems is simply that information systems follow the activities to be supported. Organisations within the DOD contain a variety of processes based on their missions and environmental constraints. If the organisations of the DOD are analysed against the background of the business processes as explained by the value chain of the DOD (Figure 3.2) the following deductions can be made (Republic of South Africa, 2002b: 26-28):

- The core process of all headquarters from level one to three is Direct the DOD or a part thereof and all headquarters will have a domestic organisational management process that will also form part of the Direct the DOD process.

- All headquarters will have some supporting processes and the extent thereof will be determined by the environmental situation.

- Force Structure Elements on level four will have as core processes any of the following: Provide Defence Resources; Prepare Defence Capabilities; Employ Defence Capabilities and Support Defence Activities.

- Force Structure Elements on level four will have a domestic organisational management process that will also form part of the Direct the DOD process.

- Force Structure Elements will have some supporting processes although the extent will be determined by the environmental situation.

The significance of the process to organisation relationships is that the activities within the Direct DOD and Support Defence Activity processes are present in all DOD organisations. It implies that information systems in support of these activities will become important due to the extensive organisational impact. Other operating activities are present mainly at level four organisations based on their respective missions. Information systems supporting these activities must have a more specific user group and focussed deployment (Republic of South Africa, 2002b: 40-41).

This necessitates full connectivity and interoperability between the different systems. The DII architecture needs to provide all of the technology, interface and data standards for this (Needham, 2000: 13). Information must be processed and delivered to all SANDF services and divisions. Joint operations will force the DII to be flexible to extend across all organisational boundaries. Although various architectures have been analysed the past two

years in the DOD it represented functional viewpoints mostly. The available architectures represent scattered requirements and in some domains, almost no architecture is available.

To reduce cost of computing services and still meet user requirements, it is imperative that the DII is shared by all DOD business elements. The sharing of information across traditional barriers empowers the commanders and decision-makers to act decisively and facilitates a unified SANDF with a shared knowledge base. Data sharing should lead to an environment where data is entered once at the source, thereby reducing the cost and lack of reliability of maintaining multiple applications that store similar or the same data (Needham, 2000: 18).

Defence information systems must be designed for DOD with wide access balanced against security restrictions, privacy laws, and the confidentiality of data. This will adversely change the systems engineering approach from a functional based (silo) approach to process based (modular) systems engineering approach. This will lead to the perpetuation of "silo" systems with little or no interconnectivity and sharing amongst DOD services and divisions (Republic of South Africa, 2002b: 26-28).

The process approach necessitates a different mindset when addressing applications and information in order to reap the potential benefits of the process approach. The business activities of the DOD as illustrated by the value chain of the DOD (Figure 3.2) remains the primary source utilised in identifying information and application potential. The process approach requires an integration of the current systems and facilitates the need for integrated management information.

4.9 INFORMATION SYSTEMS INTEGRATION

Managers at different levels require different types of information to assists them in the execution of their duties. Some require operational reports, while other require multidimensional or management reports. Other want to have information alerts and others still want to create queries on the fly. All of these diverse needs of managers can only be satisfied with a single, consistent and integrated information management environment (Cognos, 2001: 7).

Information systems integration is defined (Bhatt, 2000: 1337) as the extent to which data and applications through different communication networks can be shared and accessed for organisational use. The main purpose of information systems integration is to provide consistent information support throughout the organisation to respond to dynamic challenges

in the markets. Information systems integration should not only facilitate the process of development and use of data applications and other processing technology, but also provide the flexibility to meet the future business demands in workstations, processing types, and applications (Bhatt, 2000: 1338-1340).

In co-ordinating the activities of an organisation, different business units require access to consistent data about the activities of different departments. To gain increased effectiveness in sharing data, it becomes important that an organisation develop common data resource management policies. By increasing the standardisation of data definition and codes, an organisation starts moving toward integrated systems development. The standardisation of data definitions and codes also facilitates in meeting future information needs of organisations. By ensuring that data are in conformance to data definition, corporations can easily manage and compare their performance with similar and comparable functional units. The lack of data standardisation is a major underlying problem with data, often making it difficult or impossible to share or interpret data across application system boundaries (Bhatt, 2000: 1333-1334).

Information systems design is based on the requirements of the end user of the systems. Information systems are designed around processes. The business processes are mapped out from the requirements of the end user to ensure that processes used in organisations satisfy the needs of the users. For the information, systems of organisations to be standardised functional processes must be standardised. Standardised processes form the basis for the design of any integrated information systems strategy (Cumming, 2001).

According to Cumming (2001), all the business processes of the SANDF are not yet standardised. The business processes of the SANDF are tailored around the needs of the respective Services. The functional orientation and the centralised structure of the SANDF before transformation resulted in the development of separate business processes for every Service. The Services functioned in isolation and very little information systems integration was possible.

The use of distributed computing technologies resulted in the development of the multiple logistical information systems for the SANDF to support the isolated business processes of the four Services. The different logistical systems (OSIS, CALMIS) in use lead to complex logistical interfaces inside the SANDF. The complex interfaces leads to out of step data, complex and costly maintenance, excessive delays and data duplication when interfacing takes places between the different types of systems (Holder, 2001). These difficulties

associated with the various logistical information systems make information system integration near impossible. The integration of data with data from other information systems inside the SANDF is very difficult and costly (Choi, Cho, Bae, & Hyun, 2000: 447-450).

The multiple logistical information systems in use complicate the standardisation of the business process of the SANDF. One integrated logistical system to support the activities of the SANDF will simplify the standardisation of business processes. An integrated logistics system should also make the connection of logistics to the rest of the activities of the firm possible. Integrated systems increase the internal level of awareness concerning the role of logistics and its links with the other functions of organisations (Feraud, 1998: 236).

The processes in the SANDF must be standardised before information system integration can take place. The first step in achieving standardised business processes is the implementation of one integrated logistical information system to support the activities of the SANDF. Two methods can be used to achieve this. The first is to develop a new integrated information logistical system according to the needs of the SANDF. The second is to buy an integrated logistical information system and then to adapt the SANDF to the requirements of the system. Regardless of the method used, the new system according to Zondagh (2001) should ensure that the logistical needs of the SANDF are addressed.

The new integrated logistical system must be modern, totally integrated and flexible enough to adapt to technology changes. It must cover the total spectrum of transactional processes at FSE level. Interfaces with other functional systems (personnel, finances, and operations) must also be ensured so that a total integrated DOD system exists (Snyman, 1998: 3). There are many debates regarding the future logistical system of the SANDF. Must a new system be developed, can COTS programme be bought and adapted, or do we have to look at the utilisation of existing systems? These questions need to be answered before a decision regarding the future logistical system of the SANDF is made.

The integration of information systems is necessary for effective management of organisational resources. Most existing information systems in the SANDF are isolated and work independently. The current information systems exist in heterogeneous, autonomous and distributed environments. Various efforts have been made for integration of information system and heterogeneous data sources inside the SANDF. The use of MOM makes the linking of information from different organisational systems with a single bridge possible. Unfortunately, the use of MOM is not a long-term solution but the advantages are that MOM

reduces cost and extends the life of the legacy systems. Uniformity in hardware platforms is essential for integrated information systems (Bentley, 1998: 4).

In the present dynamic environment, there has been an increasing pressure on private organisations to establish efficient and tight inter-organisational business relationships. The electronic inter-connectivity between two or more organisations has become a competitive necessity to reduce cost and improve services. Within a single public organisation like the SANDF, the same requirement of information systems integration for coordinating the activities of an organisation for efficiency and effectiveness has become a necessity (Bhatt, 2000: 1335-1338).

The rapid development of distributed computing technologies and the use thereof in the SANDF has increased the need to integrate heterogeneous, autonomous and distributed information systems in an information driven integrated systems environment. Some of the benefits that the SANDF can attain with the complete integration of information are productivity improvement through automation, project cost reduction, time optimisation and improved management.

Integrated information systems should improve the performance of the various business processes of the DOD and increase flexibility with respect to meeting customer expectations. Improve communication and the minimising of repeated data entries can be achieved by information systems integration initiatives. A fully integrated information management environment substantially increases the opportunity for additional automation and other improvements throughout the entire value chain of the DOD (Back, 2001: 16-19).

4.10 THE CHOICE OF INFORMATION SYSTEMS

To achieve an integrated information management environment the SANDF should adopt a central system to support all its fundamental transaction processing. This might be done through the acquisition of an ERP product for example SAP, or by combining, one or two packages and some key self-developed systems of the SANDF into what might be seen as a custom-build ERP system.

If the SANDF is considering a major systems upgrade to achieve the desired integrated information management environment the fundamental value considerations of such an upgrade must be assessed. The value considerations that should be considered are the life

cycle cost of purchasing and the fact that implementing and maintaining an ERP system may require a payback period of several years (Ayers, 1999: 33).

If there is a choice between selecting and using an ERP system, or building a core system by using some key self developed systems (legacy systems) of the SANDF and the best of breed products, alternatives should be looked at and the reasons for choosing one or the other be considered in detail. Some of the reasons why legacy systems might be retained by the SANDF are (Ayers, 1999: 33):

- The current legacy systems of the SANDF performs a specific set of functions that will always be required;

- An ERP system will not be implemented all at once; some legacy systems might need to be bolted on until the ERP system is fully operational;

- There are business process issues that will not be resolved, so the old functionality must be retained.

Legacy systems present some unique challenges when bolted to an integrated system. The nature of the interface between the legacy system and the integrated system may be more complex than with other current packages. The interface most probably will be customised resulting in higher maintenance costs. More maintenance presumably would be required when the integrated system is upgraded and the program links or databases changed (Ayers, 1999: 33).

While examining business processes, functional needs and the role of bolt on products several questions must be considered. Is the bolt on product sufficiently better than the product provided by the integrated system to justify the added cost? Are the requirements of the product clearly defined? From an operational perspective, if the products are interfaced is the frequency of data transfer satisfactory in both directions (Ayers, 1999: 33)? What complications are you going to run into because of different hardware platforms, operating systems, and database structures? Emphasis must be on the fact that it may take just as long to create interfaces between the legacy system and the new systems as it would take to redesign the business processes applicable to the legacy system to fit the new integrated system.

The true value of an integrated information management environment is only found when it becomes the foundation or language to discuss the organisation in a common fact basis way. While information management deployments may start with Services or Divisions of the SANDF, the solution must be able to serve customers, partners and employees in multiple departments across functional defined boundaries. Deploying information management on an organisational scale across the SANDF must support the broad and varied methods of delivering information to managers across the organisation (Cognos, 2001: 11-14).

Users must be able to pull information to them and information must be pushed to users as required. In this way, managers and commanders can remain continuously informed and make informed decisions (Cognos, 2001: 7). The status of the resource information and the way it is managed will have an effect on the operations of the SANDF. More efficient information management practices should improve the efficiency of operations inside any organisation.

4.11 INFORMATION SYSTEMS SUPPORT

The degree to which the SANDF can achieve a balance between desired service levels and cost controls, depends at least in part upon the quality and type of information available to support decision-making. Extensive information is typically needed. Information systems therefore should be viewed in a more holistic manner in order to capture the multiple dimensions and understand the value of information accumulation and dissemination within and across organisations more fully (Daugherty, Myers, & Richey, 2002: 87).

The SANDF should not only plan how to use its information resources, because status of those resources influences the strategic plan of the entire organisation. Information management strategies are needed to help guide business investments in information systems. These strategies should provide for the integration of information and avoid being functional or discipline focussed (Back, 2001: 14). Figure 4.9 illustrates this mutually reinforcing effect.

When the SANDF plans in this way, it takes stock of its information capabilities as it considers what it intends to accomplish in the future. This self-appraisal enables the managers and commanders to correct any deficiencies in the information systems, which might weaken the ability of the SANDF to accomplish its objectives. It also enables the SANDF to capitalise on any strength that could be used to achieve competitive advantage

(Mcleod, 1999: 713-714). Information systems support is viewed as consisting of three distinct dimensions: capability, compatibility and technologies.

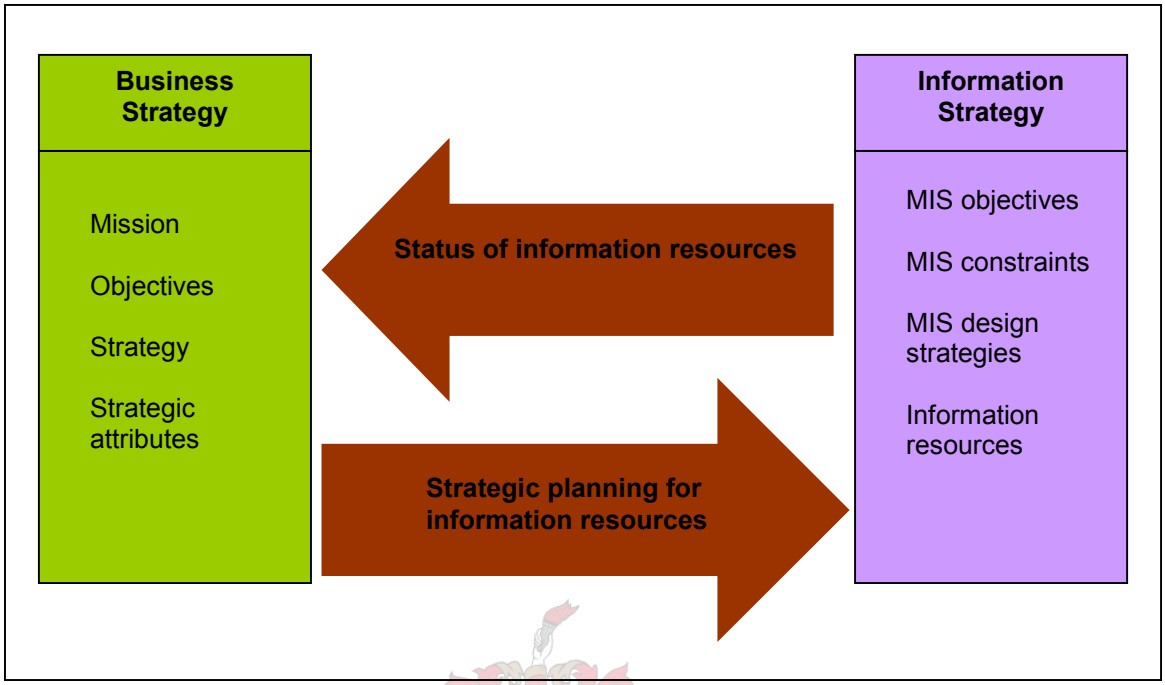


Figure 4.9: Information Resources Influence Business Strategy (Adapted from Mcleod, 1999: 713).

4.11.1 Information Systems Support Capability

Capabilities are bundles of skills and knowledge that help provide competitive differentiation. The SANDF should try to develop capabilities that are distinct, defensible and difficult to imitate, thus providing true competitive advantage. Capabilities also embrace business behaviour and processes. Consistent with this information systems networks must be responsive in order to anticipate and accommodate operational change and customer demands. This means information must be continuously accessible and shared across organisational boundaries (Daugherty, Myers, & Richey, 2002: 88).

4.11.2 Information Systems Support Compatibility

The effective fast cross-organisational sharing of information is possible only if information systems in use are compatible. Compatibility implies the existence of congruent systems that facilitate exchange between entities inside organisations. The current functional systems of the SANDF are not supporting compatibility. These systems were designed from

a functional perspective over a period of years. The systems therefore use different databases because information technologies were used in their design (Republic of South Africa, 2002b: 36).

4.11.3 Information Systems Support Technologies

Information and information technologies have long recognised the potential to serve as competitive weapons critical to the support of overall strategic initiatives. The differentiator between leading edge organisations and average organisations is the leading edge performer ability and willingness to invest in state of the art information technologies (Daugherty, Myers, & Richey, 2002: 88).

As the cost of hardware and software goes down, and the pressure from users to provide more data, more speed, and more flexibility goes up, the SANDF is faced with two daunting tasks. The first is finding time to stay current with emerging technologies; the second is evaluating alternatives and investments in information technology with a variety of unknowns. Because of the large amounts of money and huge risks associated with the acquisition of information systems support technologies the process is time consuming (Information Systems Management, 2001: 5). The budget restrictions placed on the SANDF and CMI Division makes the investment in state of the art technology nearly impossible within the present budget framework.

4.12 SUMMARY

The Promotion of Access to Information Act and the PFMA is intended to foster a culture of transparency and accountability to establish a more effective corporate governance framework for the Public Sector of South Africa. The SANDF is moving unavoidable closer to an accountability framework based upon transparency and compliance with legislation and regulations. An integral part of this framework is the requirement to provide clear and unambiguous evidence of how and why decisions are made. If managers and commanders are going to be more accountable, information must be available to assist them in decision-making and exercise proper control in the organisation.

Before transformation in 1997 the SANDF business activities, organisations and subsequently information systems were primarily identified from a functional perspective, which led to a centralised and power orientated structure of the organisation. After transformation, the SANDF was restructured into a more flat structure suggesting emphasis

on co-operation, joint planning and operations. As part of the transformation of the DOD, it has become apparent that a base structure must be formulated to ensure that the main core business of units will not be hampered by the support function. This support structure has given rise to the GSB concept that will ensure common support to all FSE's.

As information systems naturally follows business activities it is logical that the current information systems of the SANDF are functionally orientated which makes the sharing of functionality and data troublesome. The new integrated forces concept place new service requirements of information and data sharing upon the information systems of the SANDF. The current physical design of information systems in the SANDF makes it nearly impossible to support an integrated forces concept.

The availability and access to relevant information is critical for managers and commanders to succeed in an integrated forces concept. Due to the inconsistencies in the data provided by the current information systems of the SANDF, there is no real guarantee that the available management information provided to commanders and managers is reliable. In its present state management information provided by IMS is inadequate to support an integrated force concept effectively.

The process approach adopted by the DOD towards organisation restructuring necessitates full connectivity and interoperability between the different information systems of the DOD. Subsequently the DOD must adopt a process orientation as a principle for information systems design. For connectivity and interoperability between the information systems, the systems engineering approach must change from a functional base (silo) approach to a process based (modular) approach.

The integration of information systems is necessary to provide consistent information support throughout the SANDF. The integration of the information systems should improve the performance of the business processes and increase organisational flexibility. The business processes of the SANDF are not standardised a prerequisite for information system integration. To achieve an integrated information management environment a central system should be adopted to support all the fundamental transactional processes. This can be achieved by the acquisition of an ERP product or by combining self-developed systems into a custom-build ERP system.

The available architecture of the information systems in the SANDF is clearly inadequate in its present state to support an integrated process approach, as the focus in the past was on

the transactional operating systems. The degree, to which the SANDF can achieve a balance between the desired service levels and cost controls, depends upon the availability and type of information available to support decision-making. The status of the information resources will therefore have an influence on the strategic plan of the SANDF.

In conclusion, improvements to the current information systems and IMS of the SANDF are required to support an integrated forces concept like the GSB concept, and assist managers and commanders to adhere to legislation and regulations promulgated by government.

CHAPTER 5

OVERVIEW OF PROPOSALS TO IMPROVE INFORMATION MANAGEMENT PRACTICES INSIDE THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

5.1 INTRODUCTION

Organisations today are challenged to do things faster, better, and more cost effectively. As a result, a strong need to share knowledge exists in a way that makes it easier for individuals; teams and organisations to work together to effectively contribute to the success of an organisation. To achieve organisational success relevant information and access to it must be provided to individuals and teams when it is required and in a data format that is usable to them (Van den Hoven, 2001: 80).

Timely information for decision-making therefore is now more important than ever before. Management make decisions by using information obtained from formal (information systems) and informal sources (face-to-face communication) of organisations because managers rarely observe operations directly. The reports produced by the information systems of an organisation are only valuable if managers can use the information for decision-making and control purposes (Bentley, 2002: 29). Frequently information is provided by information systems that mean nothing to decision-makers of organisations.

The reason for this is that in the past the focus of most of the information systems of organisations has been to eliminate administrative work by automating existing processes. This led to functional orientated information systems, which make the sharing of functionality and data troublesome resulting in a lack of available integrated information for decision-making and control purposes.

The current information management practices of the SANDF are a good example of these inefficient practices. The information systems of the SANDF were developed from a functional perspective to ensure proper control over the recording of transactions making the sharing of functionality and data nearly impossible. Reliable information for decision-making and control therefore cannot be provided by the information systems of the SANDF.

For the new GSB concept (integrated forces concept) to be successful managers and commanders must have access to relevant information for decision-making and control purposes. The available architecture of the current information systems of the SANDF as

explained in Chapter 4 is clearly inadequate in its present state to support the joint engagement strategy of an integrated force concept effectively. Improvements to the current information management practices of the SANDF are therefore required to support the GSB concept. Only when information is managed as a strategic resource will improvements to information management practices be possible. The same degree of importance must be given to the resource information as to any other resource of the DOD.

In this chapter guidelines to manage information as a strategic resource will be provided as well as an overview of proposals to improve the current information management practices of the SANDF to ensure that the information provided by the information systems assist in the effective and efficient functioning of the GSB concept.

5.2 MANAGE INFORMATION AS A STRATEGIC RESOURCE

The Public Service Act, Act 103 of 1994 (Needham, 2000: 25), as well as the Defence Strategies (Republic of South Africa, 2002a: 7) classifies information as a strategic resource. In order to ensure that the Defence Strategies are executed the DOD identified seven strategic objectives. These objectives form the basis of the department's core objectives and the key duties and responsibilities of its leaders and managers. One of the strategic objectives is the assurance of quality command and management information in the DOD (Republic of South Africa, 2002a: 8). The information systems of the DOD must provide the required command and management information. The importance of integrated systems to support the strategic objectives of the DOD was discussed in Chapter 4. Despite of this information is currently not managed as a strategic resource in the DOD.

The availability of timely and accurate information is paramount to sound decision-making. As such, information warrants a similar degree and level of management as any other DOD resource for example people, money, facilities and capabilities. The overall value of information to the DOD will increase when it is recognised and managed as a strategic resource. New business-orientated practices must be developed to ensure that information is recognised as a strategic DOD asset. This effort entails identifying key DOD information, then designing a system to control that information and facilitate enterprise wide data sharing (Needham, 2002: 25-26).

Defence Information Capabilities (DIC) in the DII must be developed to support the business and military objectives of the DOD. The attainment of modern technological advanced, efficient and effective information systems is expensive and constrained by scares financial

resources. The required operational and functional capability of the DII measured against the availability of financial resources demands increased value for money. Therefore, any investment must enhance effectiveness, efficiency, functional capabilities and low cost.

Changes to applications and technology can consequently only be made in response to new business needs of the DOD and not solely on the requirements to address technology trends. Designing ICT with a full understanding of the strategic goals ultimately decreases costs and increases the probability of developing effective and usable solutions (Needham, 2002: 24). The establishment of a strong alignment between information technology and organisational objectives has consistently been one of the key concerns of information systems managers (Reich & Benbasat, 2000: 81).

The alignment between organisational objectives and information management objectives can be enhanced with the establishment of an Information Strategy for organisations as illustrated in Figure 5.1.

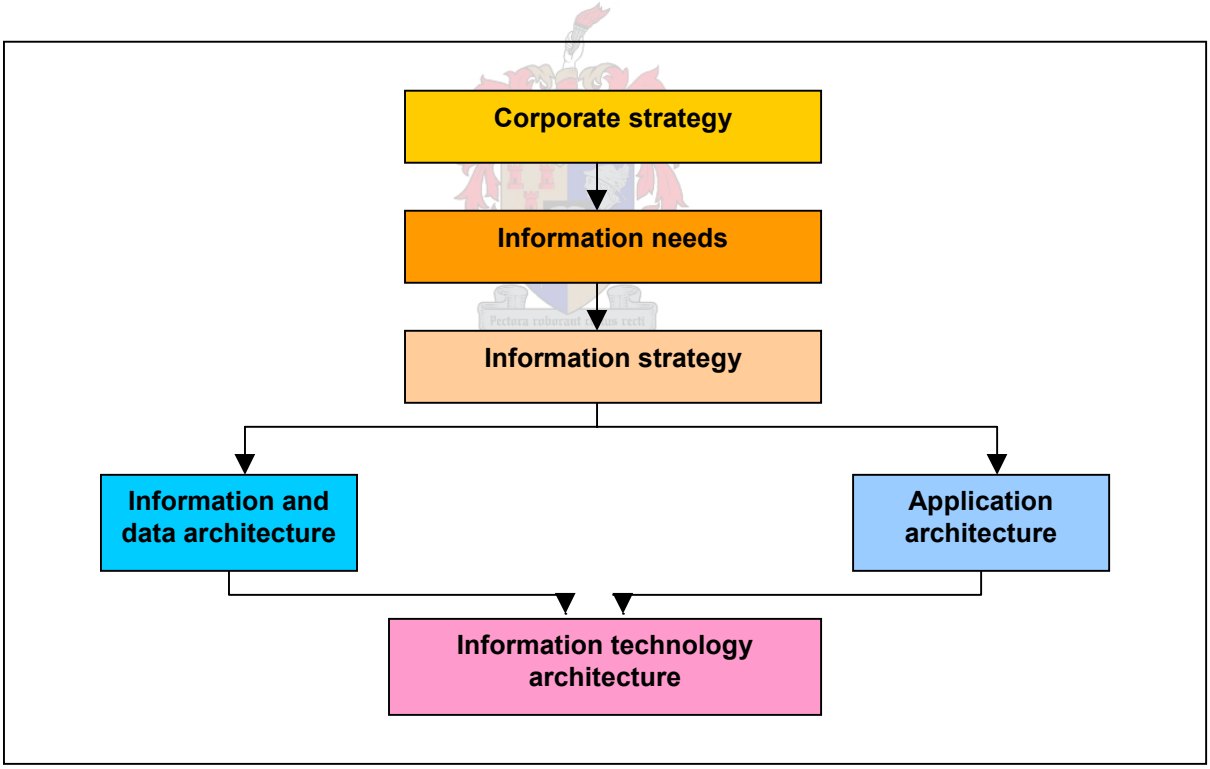


Figure 5.1: The Establishment of an Information Strategy (Adapted from Lewis & Harris, 2001: 176)

There is a complex relationship and complete set of interdependencies between the corporate strategy, the information strategy and the impact of information technology. The

information systems and information technology of organisations are developed because of the corporate strategy but to some extent it also influences it as indicated in Figure 4.9.

The information needs of organisations should be identified from the corporate strategy resulting in the strategic plan of the organisation. Assessment on how the information needs are likely to change over the period of the strategic plan must be done. The information strategy and resulting information capabilities of organisations must satisfy these changing information needs. The component part of the information strategy should be divided into three architectures, namely the information and data architecture, application architecture and information technology architecture (Lewis & Harris, 2001: 175-176).

It is important to distinguish between the components of an information strategy. The required components as illustrated in Figure 5.2, are the information strategy, the information systems strategy and the information technology strategy.

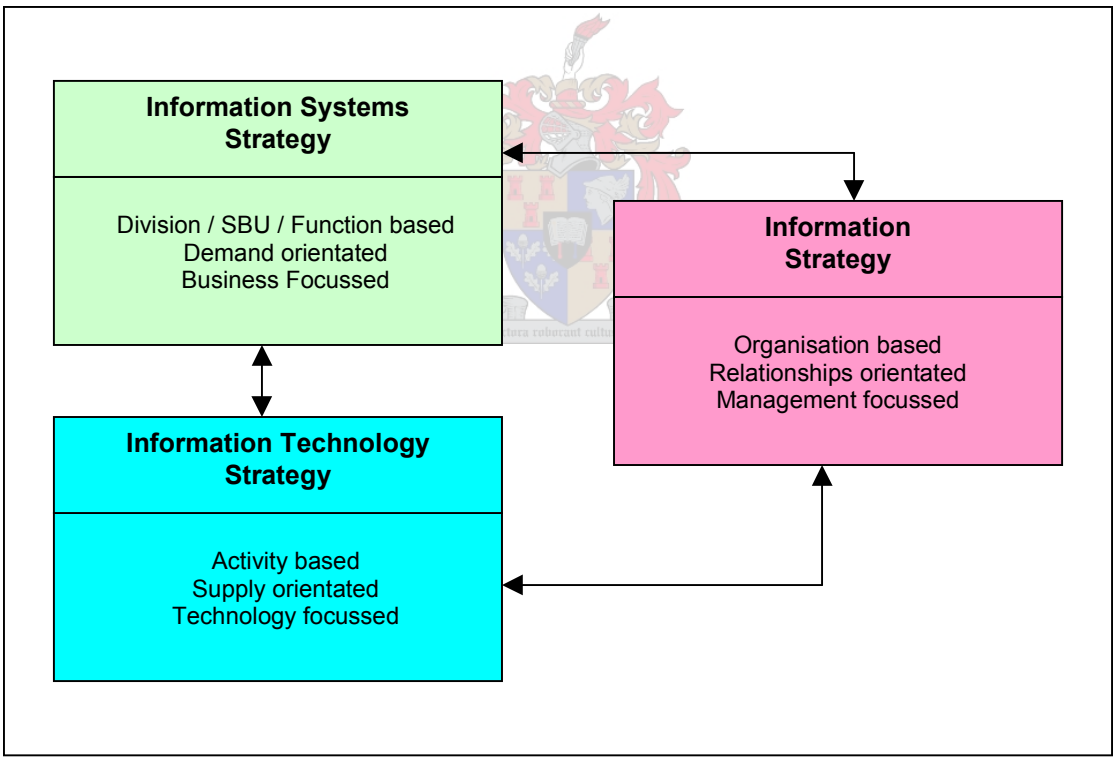


Figure 5.2: The Components of an Information Strategy (Adapted from Lewis & Harris, 2001: 175).

There is a dynamic relationship between the components requiring continuous integration and alignment of the different components. The information strategy considers how the information capabilities support business processes, the information systems strategy

focuses on the way which the information systems in various parts of the organisation are organised, while the information technology strategy focuses on the technology infrastructure of the systems.

The most effective and efficient way that the SANDF can ensure alignment between organisational objectives and information management objectives is with the establishment of a well-defined formal information strategy for the DOD. Such a strategy would be the starting point to promote the acceptance of information as strategic resource in the DOD. The major benefits of a formal information strategy for the DOD are:

- The information strategy will assist in the acceptance of information as a strategic resource in the DOD.

- Goal congruence between the information systems objectives, business objectives and military objectives can be achieved.

- The SANDF will be able to create and sustain a competitive advantage.

- The high levels of expenditure on information systems will be focussed on supporting key aspects of the business and military environment.

- Developments in information technology can be exploited at the most appropriate time for the organisation (which is not always when they are first available) to the benefit of the SANDF.

It has become a matter of necessity for the DOD to develop and maintain DIC in the DII to support the business and military objectives of the organisation. Information systems therefore must be developed and maintained to support strategic planning, every other kind of planning and the management of change in general. To achieve alignment between organisational objectives and information management objectives a formal information strategy was established for the DOD.

All of the components of an information strategy are visible in the DOD information strategy. The DOD labelled the dynamic relationship between the components of an information strategy as the "strategic trilogy of information" as depicted in Figure 5.3. A clear distinction between the Information Strategy, the Strategic Information Systems Plan (SISP) and the

Strategic Information and Communication Technology Plan (SICTP) are made (Needham, 2002: 5).

The Information Strategy provides the strategic direction for the SISP and SICTP of the DOD. The SISP addresses the requirements for information management and information systems, while the SICTP focuses on the requirements for physical ICT elements to support the DOD strategic objectives. The implemented ICT elements must support the information systems and functionalities of these systems. Because of this, the SICTP generally follows the SISP. There is, however, a dynamic relationship between the Information Strategy, the SISP and the SICTP, which requires active integration and continuous alignment.

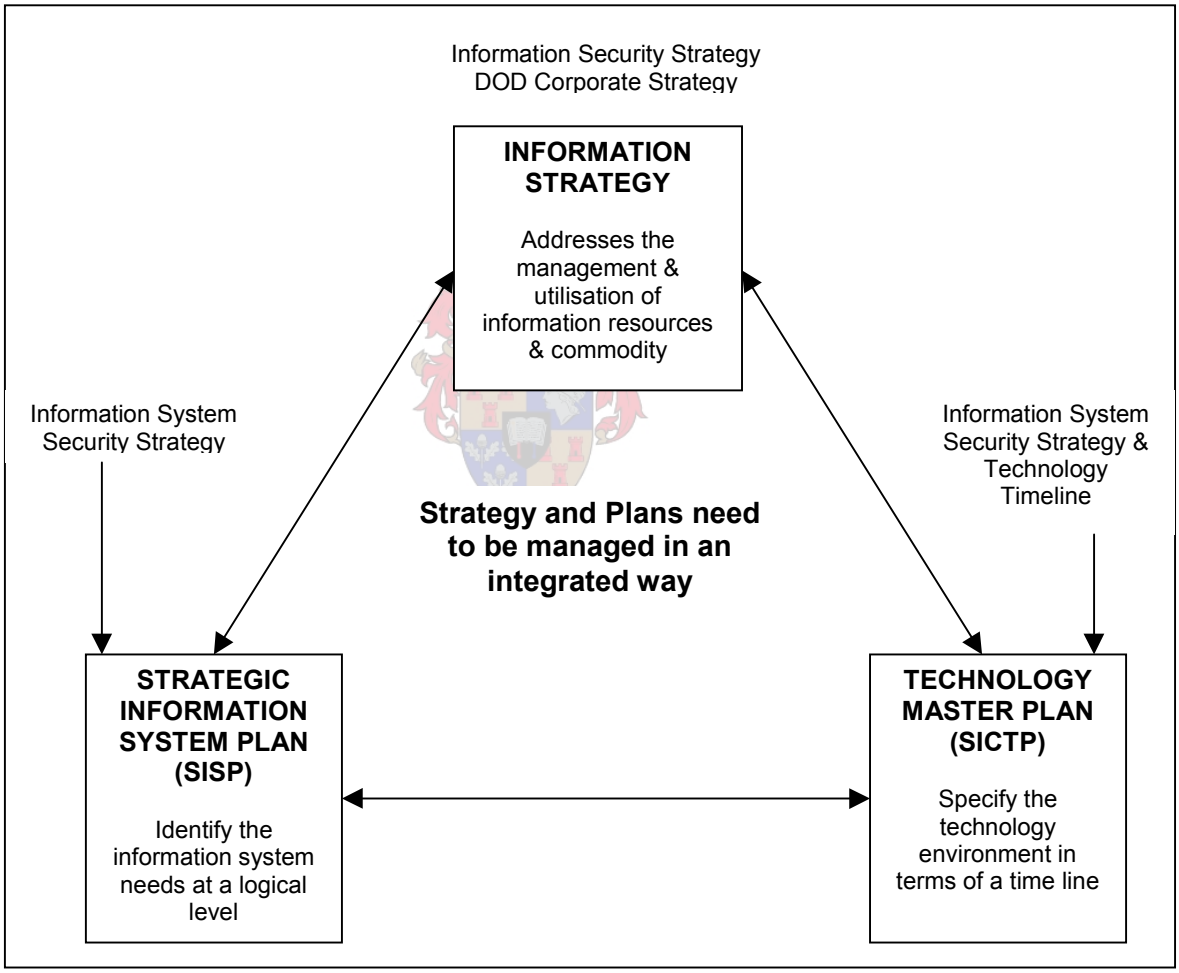


Figure 5.3: The "Strategic Trilogy of Information" (Republic of South Africa, 2002b: 5).

Although information has been classified as a strategic resource in the DOD, information has not been managed as such. The acceptance of this concept is fortunately gradually gaining ground in the DOD. The effective implementation of the "strategic trilogy of information" will

enable the DOD to manage information as a strategic resource and contribute a lot to the acceptance of information as a strategic resource by all commanders and managers in the DOD. To ensure that information is fully accepted as a strategic resource and to increase the pace of change in this regard it is proposed that the DOD implement the following:

- Governance should be developed and promulgated in order to place emphasis on information as a strategic resource in the public sector and the DOD.

- The impact of information as a strategic resource should be included in training curricula, training programmes and development programmes of the SANDF.

- A MIS (command and control system) must be formalised to accommodate information as a strategic resource. The system must ensure that the correct information is available when and where required.

- Knowledge management must be promoted in the DOD to ensure that the value added to information by people is retained in the organisation.

- Responsibilities and processes should be aligned in the DOD to ensure that value is added to information as it moves through the processes of the DOD.

- Career paths must be developed to accommodate information professionals. The skills of personnel that manage the strategic resource information must be maintained in the DOD. A non-specialised person cannot manage a strategic resource effectively.

5.3 THE STRATEGIC INFORMATION CONCEPTS OF THE DEPARTMENT OF DEFENCE

According to the DOD Information Strategy (Republic of South Africa, 2002b: 37) the strategic information concepts of the DOD are the "ways" by which the ICT products in the DII will support the DOD strategic objectives and force employment strategy. As explained in Chapter 4 it is clear that the available architecture of the current information systems of the SANDF is inadequate in its present state to support the joint engagement strategy of an integrated force concept effectively.

The enabling and delivery mechanism for information and information systems in the DOD are the DII. The requirements for the ICT products in the DII are driven by the strategies of the DOD. A functional enhancement or change to the DII is required to support the business and military objectives of the DOD. The DOD SICTP (Needham, 2002: 21-23) recommends the following strategic technology infrastructure requirements for the DII to support the joint engagement strategy of the DOD effectively:

- The DII architecture needs to provide all of the technology and interfaces and data standards to facilitate potential interoperability across DOD business, military and even embedded tactical systems.

- The DII must be able to process and transmit all types of information objects where convergence of voice, data and video as well as networks is paramount to the establishment of a unified infrastructure for the DOD.

- The DII must have the ability to support the entire DOD and should be rationalised to reduce duplication and promote sharing of ICT components within the common operating environment.

- Information must be processed and delivered anywhere to anyone that requires it in the DOD.

- The DII must be flexible to reach (and support) the joint operation environment, and must be engineered for agility to enable rapid engagement for joint operations.

- Inter-operating with non-DOD institutions requires the DII connect to these institutions and be able to exchange information between these environments. Interoperability is attained, if both parties comply with international standards.

- The DII must be highly reliable and maintainable at all levels of the organisation.

- Available financial resources will force DII initiatives to demonstrate and prove added value to the DOD at large. Financial restrictions will further enhance rationalisation efforts where duplication is eradicated and re-usability and sharing of DII components is promoted to the maximum extent.

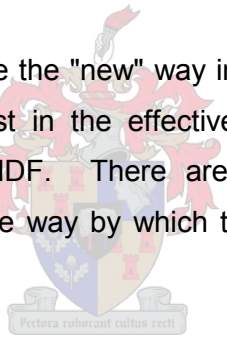
- Information must be available on demand to authorised users and maintain its integrity and confidentiality while being processed, stored and transmitted.

- Users must be provided with interfaces that are unambiguous, user friendly and highly intuitive, whilst guarding against information overload.

- The DII must be efficient and effective. It must observe the characteristics and service quality implied by all information objects, whilst heeding to restrictions imposed by the operation environment.

- Both information systems and the DII must be engineered to be modular and flexible with clearly defined separable interfaces to facilitate operations in a self-sustaining mode. Combined military operations demand that part of the DII, which supports the joint force, must be separable from the rest of the DII and information services and be able to operate in "system high" mode during the operation.

These requirements primarily define the "new" way in which the DII must function to ensure that the information systems assist in the effective and efficient functioning of the joint engagement strategy of the SANDF. There are three strategic information concepts accepted by the DOD regarding the way by which the ICT products in the DII support the strategies:



5.3.1 The Application and Information Concept

In the past the DOD business activities, management and subsequently information systems were identified from a functional perspective (explained in Chapter 4). In 1994, the DOD adopted a process approach towards organisational structuring and consequently the CMI Division accepted a process orientation as principle for information systems design (Republic of South Africa, 2002b: 38-41).

The application and information concept exemplifies the change that should follow because of viewing the business from a process perspective. The process approach necessitates a different mindset when addressing applications and information in order to harvest the potential benefits of the process approach. When functionality is developed, it is done within the context of the whole business system by identifying common elements within the application domain (Republic of South Africa, 2002b: 42-43).

To maintain the process orientation common activities must be identified within the different business processes (Figure 3.2) of the DOD. The difference between common activities and other activities is the dependence on one another. An analysis of the business processes of the DOD revealed that all the processes tend to duplicate information management activities and apart from that it was also discovered that activities already addressed within the support defence activities process were duplicated (Republic of South Africa, 2002b: 44). It is for this reason that the process SDI gained prominence implying that all information flowing externally and internally moves through the SDI (explained by Figure 3.3).

The application and information concept supports the fact that current information capabilities should be maintained until replaced. Maintenance should only focus on unavoidable changes such as those required by governance (PFMA and Promotion of Access to Information Act) and corrective requirements. Current information capabilities with a low business value should be disposed of. In domains supported by capabilities with proven functionality (high business value) but insufficient technical quality an approach of migration and integration will be followed. For the concept to be successful, a disciplined architecture approach, which includes comprehensive standards as to ensure compliance to the guiding principles of development, is required (Republic of South Africa, 2002b: 45).

5.3.2 Information Access and Processing Uniformity Concept

In support of the multi-role approach, this concept exemplifies the move away from a diverse information access and processing method towards simplicity and uniformity as a method to access and process shared information resources. The fluctuation over time pertaining system development thinking and construction methods has resulted in diverse implementations of information systems in the DOD (Republic of South Africa, 2002b: 45-46).

This led to an overly complex user environment that is characterised by a diverse set of client side applications, inconsistent information access and security features that are often unique to an application (Needham, 2002: 35). From a data centre perspective, the different functional applications and data stores perpetuate silo functions that impede information exchange across functions and complicate the management of system security (access and authorisation). This concept will address the problem of complexity and diversity in three ways (Needham, 2002: 35-36):

- Firstly, the user environment should be standardised and simplified by means of a COE desktop.

- Secondly, the communications means between the client and server must be reduced to a finite yet controlled set of protocols.

- Thirdly, the way to access and process information should be channelled not directly to a functional application, but through a single entry point (portal) to facilitate enterprise wide security measures and standardise information presentation.

For this concept to be successful, the COE desktop must be pre-configured with a set of common enabling components and unique mission specific enabling components. The set of common enabling components must be both universal and standardised to all desktops in the DOD. The unique enabling components are qualified as those components for which the capability cannot be fulfilled by any of the common enabling components. A web browser will provide the user interface to the information repositories. Access to information repositories will be channelled via a universal portal that maintains the profiles for each role as defined in the multi-role approach. Using the profile, the access portal will be able to provide the user with authorised and relevant access to information in accordance with the role of the user (Republic of South Africa, 2002b: 47-48).

To enable information exchange across functions, every application must be able to communicate to any repository via a universal interface. Applications are thus no longer tightly integrated with a particular repository on a one to one basis. They are loosely integrated and more importantly, the repositories are restructured to reduce the duplication of data (Needham, 2002: 37).

5.3.3 The Dynamic Defence Communication Network Concept

The concept is designed to support the military and business users of the DOD. This is achieved by having connectivity anywhere by any communications means to any authorised data source. It exemplifies the move away from islands and silos towards an integrated and shared environment that enables the integration of information amongst the tactical, mobile and static environments.

The problem of islands and silos will be addressed in three ways that will result in the Dynamic Defence Communication Network (DCN). Firstly, the current segmented DII will be addressed, secondly, the network focussed DII will be discussed to address the manner in which data will be processed in the Dynamic DCN and thirdly, asynchronous data

interchange, as the mechanism to automate data interchange between the environments will be discussed.

5.3.3.1 The Segmented Defence Information Infrastructure

The DII must be dynamic and segmented into one Static DII, one or more Mobile DII and one or more Tactical DII, interconnected through clearly defined ports. The Static DII will serve the day-to-day activities of the entire DOD, while the Mobile and Tactical DII will only support business and military operations required by deployed forces. Each DII segment comprises a communications network, one or more data centres, and an information gathering and decision cluster (Republic of South Africa, 2002b: 51).

The Mobile DII is an extension of the Static DII with the ability to disconnect from the Static DII (if connected) and then move with the deploying force, redeploys and reconnects to the Static DII. A Mobile DII is dynamic and self-sustaining and can be constructed or dismantled when required. The Tactical DII is a dedicated combat orientated DII that can connect via a port to the other DII or multi-national force infrastructures as and when required. It is also dynamic and self-sustaining and can be constructed and dismantled when required (Needham, 2002: 39-40).

The secure port is a comprehensive, secure and intelligent component. Its purpose is to facilitate connections between different infrastructure segments and functions as a natural security border between infrastructure segments on both network and application level. This will allow each segment to operate in a particular mode of combat state readiness that is independent and unaffected by another segment (Needham, 2002: 40).

5.3.3.2 The Network Focussed Defence Information Infrastructure

The focal point of the DII moves away from the central data centre towards the DCN. The DCN is a dynamic, unifying component of the DII that facilitates interconnectivity between all components of the DII, within and across different segments utilising a finite universal protocol set that is optimised for the different environments. All networks within the DCN will be able to transmit data and voice on a shared transport medium. The communication medium of the DCN will be able to utilise all communications mediums in the DOD in any combination to support flexibility required by each segment (Republic of South Africa, 2002b: 51).

The strategic data centres are data centres that collectively constitute the information assets of the DOD. The data centres will be rationalised to provide effective control over the DOD information assets. The centres will be strategically positioned (and located) to satisfy the business and military force employment strategy (integrated forces concept) of the DOD (Needham, 2002: 40).

5.3.3.3 Asynchronous Data Interchange

For a DII segment to be self sustaining and able to operate with high availability it requires a data centre that is configured for the deployment of the segment. The different data centres need to exchange and replicate information frequently amongst them to synchronise information across the respective environments. The replication and synchronisation of information between data centres uses asynchronous, MOM techniques. The MOM techniques enables replication and synchronisation to be continuous, interrupted or at scheduled intervals. Synchronous information processing can only continue if both components are reliable during the connection period (Needham, 2002:40).

5.4 THE PROPOSED INFORMATION CAPABILITIES OF THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

According to the executive summary of the DOD Information Strategy (Republic of South Africa, 2002b) the mandate of CMI Division is to act as enabler in ensuring the availability of appropriate information to support command and management decisions and accounting in the DOD. In order to fulfil their mandate CMI Division must provide the required information capabilities to ensure that information is available to the right people, at the right time, in an efficient, reliable and secure manner.

The proposed DIC, as illustrated by Figure 5.4, emanates from the strategic information concepts of the DOD as discussed in the previous section. It constitutes the complete set of information systems required in the SANDF to support the DOD military and business missions, comprising of the following information capability products (Republic of South Africa, 2002b: 54-55):

- Defence Application Portfolio. It comprises a complete set of applications software elements to provide the information processing capabilities equal to the DOD business processes.

- Defence Information Infrastructure. The DII comprises a complete set of ICT elements that form the foundation for information processing capabilities commensurate to the defence applications.

- Common Operating Environment. The COE forms a comprehensive set of common and enabling defence information systems (applications and infrastructure) in support of SDI business processes (part of Support Defence Activities), as it supports and enables all other business processes of the DOD (Figure 3.3).

- Unique Applications and Infrastructure. It comprises defence information systems (applications and infrastructure) in support of all non-SDI business processes.

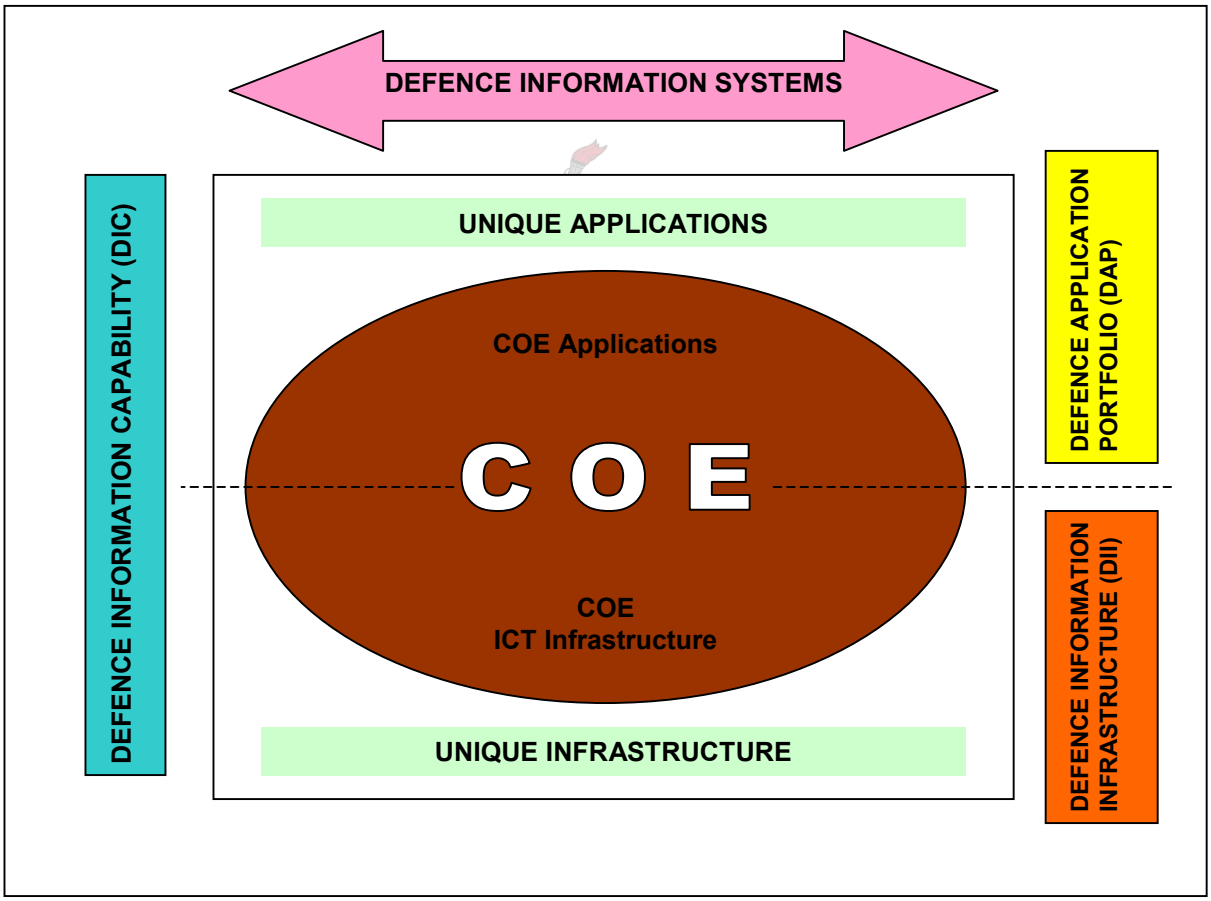


Figure 5.4: The Proposed Defence Information Capabilities of the SANDF (Republic of South Africa, 2002b: 55).

5.4.1 The Proposed Defence Application Portfolio of the South African National Defence Force

The proposed DAP as illustrated by Figure 5.5 depicts the end state DAP and comprises the following layered application building blocks (Republic of South Africa, 2002b: 43):

- Common Operating Environment applications. They support the generic processes that form part of the SDI process (Figure 3.3) such as the supply, maintenance and disposal of information. It entails the flow of information to and from the external environment as well as the flow of information between all other DOD business processes. Prominent applications within this domain are security and messaging.

- Military unique applications. Military applications refer to applications in support of the DOD business process as illustrated in Figure 3.2. These applications will however, have the largest impact on the Direct the DOD and Employ Defence Capability processes. Provision is made for certain unique elements within the other DOD business processes. Examples of military unique applications are navigational applications, applications as part of weapon systems management and intelligence collection applications.

- Business unique applications. Business applications refer to applications in support of the DOD business processes. It represents all applications with the exception of COE and military unique applications. Examples are resource support applications, general management, and resource management applications.

5.4.2 The proposed Defence Information Infrastructure

The proposed DII is a comprehensive integrated structure of ICT product elements that is utilised to capture, store, and process, transmit and present information in the DOD, in every location of the business and military operating arenas. The proposed DII as illustrated by Figure 5.6 constitutes the enabling mechanism, the means that will form the foundation for information processing.

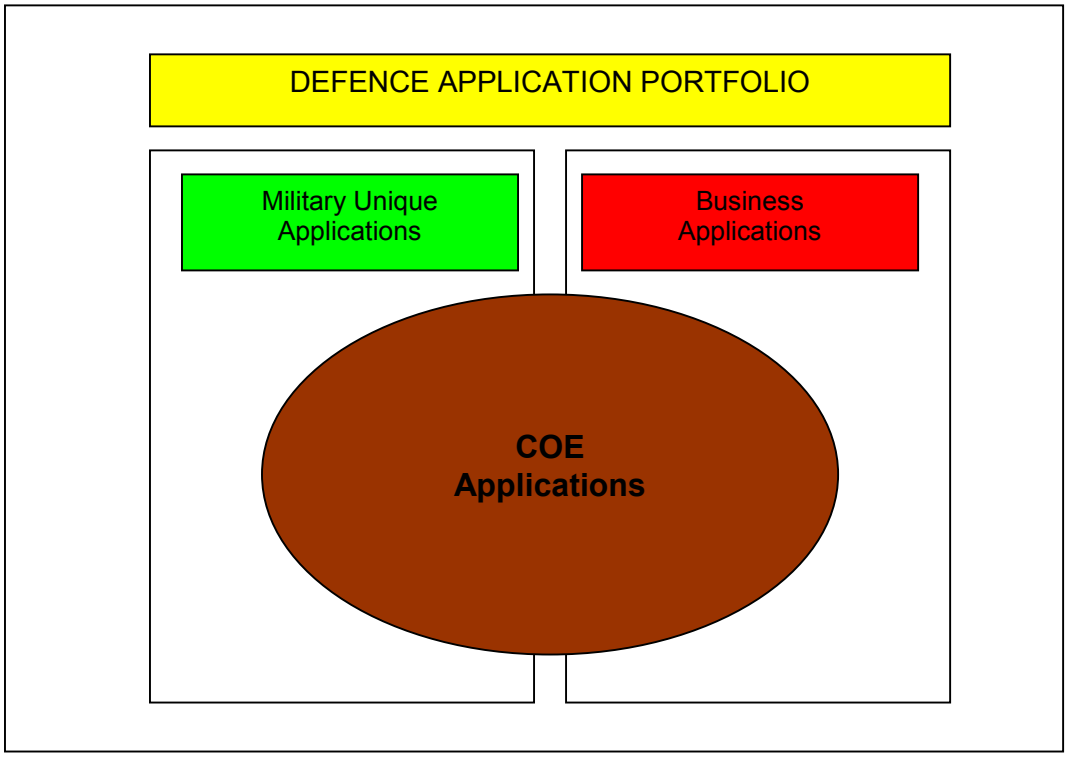


Figure 5.5: The Proposed Defence Application Portfolio of the SANDF (Republic of South Africa, 2002b: 56).

The proposed DII will enable information processing that spans across the static, mobile and tactical environments and comprises the following DII capability elements (Republic of South Africa, 2002b: 57-58):

- Logical integrated Defence Communications Network. The DCN forms a single locally integrated and resilient communications network that provides communication means within the static, mobile and tactical environments. Each segment of the DCN is equal to the characteristics of each environment. Interconnectivity amongst the different environments is achieved with an intelligence secure port that supports the multiple deployments of mobile and tactical environments.

- Uniform data processing. It forms a centralised, resilient and uniform data processing capability for each environment that is configured to optimise information sharing within and between the different environments.

- Information users and providers. It entails the complete set of information users and providers that utilises a standardised, common end user computing capability for all environments and unique computing capabilities as required by each environment.

- Information security and system management services. This service must provide the information security and information system management capability to establish and sustain the assurance, quality and readiness of the DII in context with every environment.

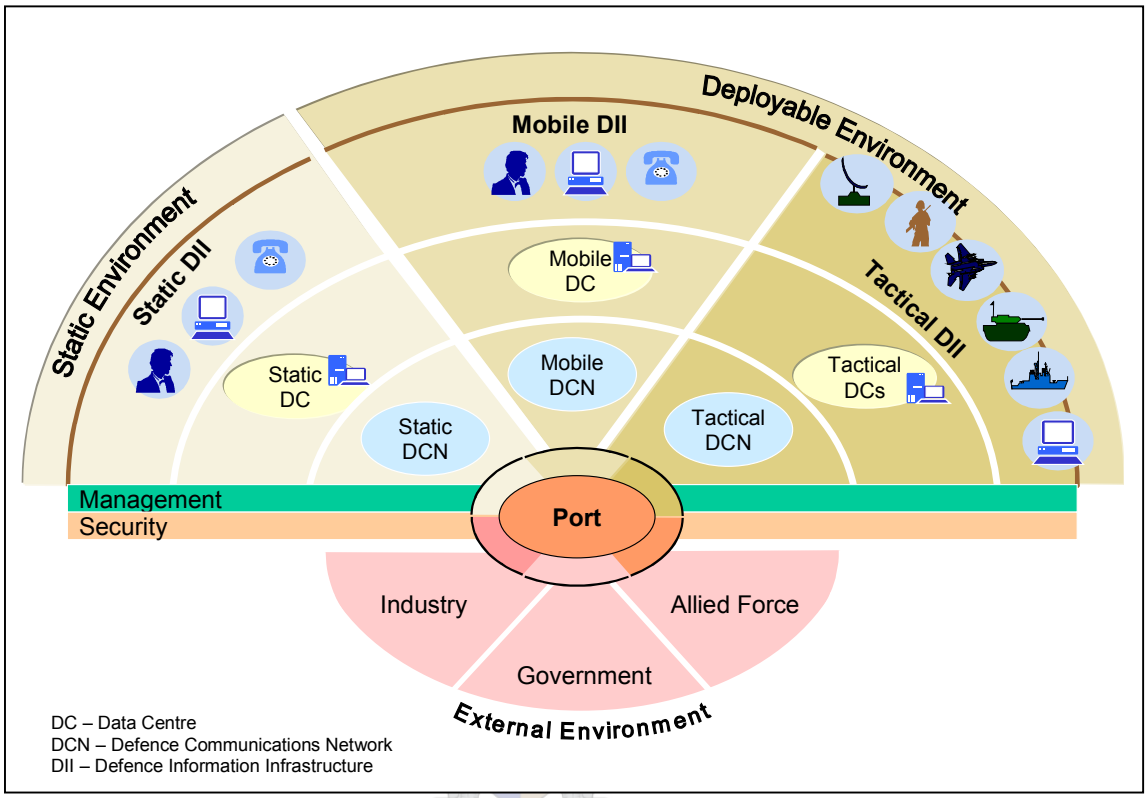


Figure 5.6: The Proposed Defence Information Infrastructure of the DOD (Republic of South Africa, 2002b: 57).

5.5 THE PROPOSED IMPROVED MANAGEMENT INFORMATION FACILITIES FOR THE DEPARTMENT OF DEFENCE

Currently the IC databases provide management information for managers inside the DOD using data from current mainframe systems. The management reports are generated with IMS SAVINFO or the IC Shell as illustrated in Figure 4.7. SAVINFO is mainly used for structured, standardised reports and the IC Shell for ad hoc request from managers. The DW provides management information for higher level managers using data from the IC and other data sources such as CALMIS and OSIS. The information delivery applications reports are currently presented on a mainframe terminal (Haasbroek, 2002).

To support the GSB concept of the SANDF the information management facilities of the DOD must be improved. Managers and commanders on all levels require management information to assist them in planning, decision-making and control. The data inconsistencies that exist can only be improved if the information provided by the information systems is improved. The provision of an integrated DIC, as illustrated by Figure 5.4, consisting of the DAP and the DII will eliminate the inconsistencies caused by the current legacy systems of the DOD.

According to Haasbroek (2002), the way forward is to deliver management information applications on a web-based technology. With web-based technology more users can be accommodated and more information provided to prospective users. Users will be able to request and retrieve reports from both the IC and DW at the same time. Access will be limited according to business rules and certain security limitations. Users will be restricted to information that they require to execute their tasks efficiently. For instance, the commander of an Infantry company will not have access to the medical systems or the PERSOL system. Specialists should be appointed to execute these functions and access to these systems will be granted to them (Haasbroek, 2002).

All users must know what type of information is available and what type of information can be produced. For example, the user cannot request to compare summarised OSIS data and non-summarised CALMIS data. This situation is referred to as the business rules of management information facilities and users must be trained according to these rules.

The web-based technology is only the delivery mechanism of the information. The technology uses an Internet type method to deliver information to managers and commanders. Reports are stored on the Intranet of the DOD and the prospective users can access the stored reports via their desktops. This Intranet is only accessible to employees of the DOD, access is restricted according to the tasks that the individual must perform, and the information required performing the task (Haasbroek. 2002).

The data owners determine the profile and access level of the information. The DOD Intranet will be utilised to push the information forward to the front end users. This principle of pushing information forward can be referred to as the "Back Office" principle. The users access the information on the web-based technology. Users cannot generate reports themselves. The specialist using both the IC and DW generates reports. The practice to generate ad hoc reports for specific managers must become absolute while standardised reports must be produced according to the needs of the users. These reports can be altered

as the requirements of the user change (Haasbroek, 2002). Reports will therefore be generated according to the information requirements of the users. The reports available must fulfil the information needs of the users. Ad hoc reports can still be generated but this must only be done to fulfil a specific organisation need at a specific time. The current user and prospective users gain access to management information using a defence web like the DOD Intranet. By using this web-based technology, the past practice to distinguish between IC and DW users will become distinct. This proposed improved information management facilities are illustrated in Figure 5.7.

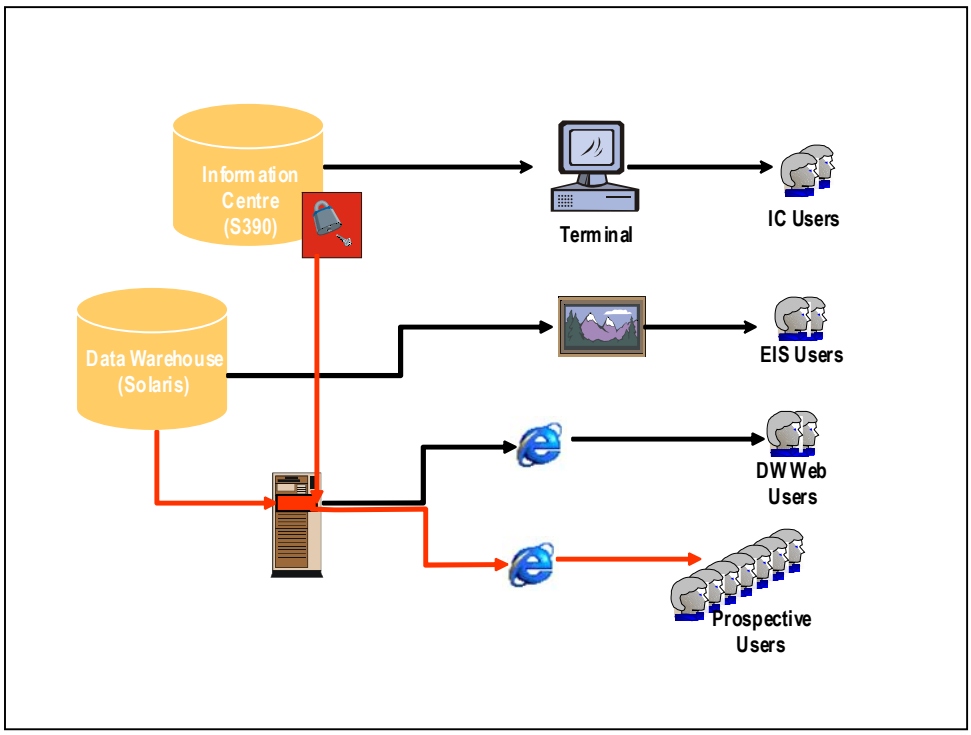


Figure 5.7: Information Distribution: The Way Forward (Haasbrooek, 2002).

5.6 PROPOSALS TO IMPROVE THE LOGISTICAL INFORMATION SYSTEMS OF THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

The multiple logistical systems (explained in Chapter 4) in use in the SANDF resulted in complex interfaces and are characterised by out of step data, complex and costly maintenance, excessive delays and data duplication. Users are required to capture the same data on different applications resulting in expensive user training on different applications to perform the same function. The different design philosophies of the current logistical systems resulted in permanent data inconsistencies making the support of the GSB concept near impossible (Holder, 2001).

For the GSB concept to function effectively the current logistical systems in use must have the ability to communicate with each other. The first requirement for effective logistic support is to convert the SAMHS units who utilise DIMS or UIMS to either CALMIS or OSIS. With this conversion, the technology platforms of the corporate logistical systems will be rationalised. The prerequisite for the success of the conversion is the accelerated implementation of OSIS and CALMIS in the SANDF (Cumming, 2001).

With the successful conversion of DIMS and UIMS to CALMIS or OSIS there will be only three main logistical systems in operation left in the SANDF namely CALMIS, OSIS Navy and OSIS SAAF. The SA Navy and SAAF business processes are comparable and therefore the logistical systems used by them can interface with each other. The problem in linking OSIS to CALMIS is that the operational systems (software) and technical standards used by CALMIS and OSIS differ resulting in data incompatibilities.

In order to facilitate interfacing between the various corporate systems, CALMIS and OSIS, it is necessary to move to distributed platforms technology (Beverley, et al., 2002: 10). This can be achieved with MOM links enabling the systems to communicate to a centralised hub and consequently with each other. The MQ Series links utilised by the SANDF will provide the required functionality to the logistical information systems enabling them to communicate with the mainframe of the SANDF and with Armscor. The hub will process information and communicate it back to the different logistical systems (Needham, 2002: 40).

The medium term future of the logistical information systems of the SANDF therefore is on scattered platforms. To achieve scattered platforms the corporate logistic systems must be removed from the mainframe of the SANDF and added to the existing hubs for CALMIS and OSIS. The utilisation of the existing hubs will ensure cost effectiveness. The corporate systems will continue to exist until the need for it becomes obsolete. CALMIS and OSIS have the ability to provide the same information corporate LIMS is providing now therefore planning should be done to ensure the out phasing of corporate LIMS.

According to Holder (2001), the logistical systems must be grouped into the existing hubs as follows:

- The corporate reference data systems must utilise a hub: OIS, II and the other DOD systems.

- The corporate transactional systems must utilise the second available hub: ER, FRS and the OAS.

- The unique transactional systems utilise the last existing hub: CALMIS, OSIS SA Navy and OSIS SAAF.

A hub will unfortunately only have the ability to link the logistical systems on stock management level. Regardless of this, the different logistical systems will now have the ability to communicate with each other, although only on stock management level. This will enable the FSE's to do requisitions by means of the different logistical information systems of the SANDF (Coetzee, 2001). The FSE's will communicate to the transactional systems namely CALMIS, OSIS SA Navy and OSIS SAAF as illustrated by Figure 5.8. Until this is achieved, it is recommended that the hand system must be utilised for requisitions across the different logistic management information systems of the SANDF.

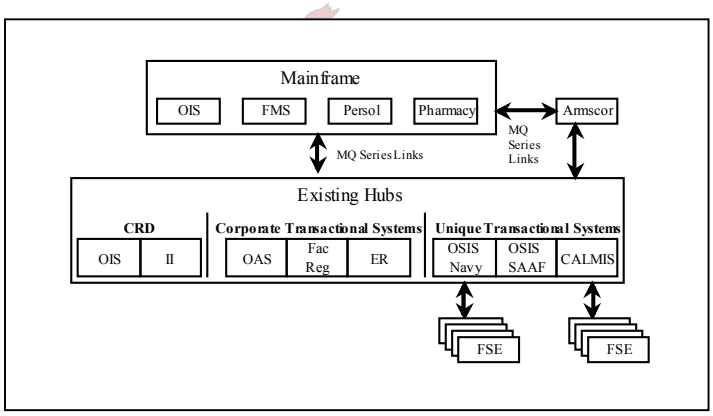


Figure 5.8: The Medium Term Solution Design for Logistical Information Systems inside the SANDF (Adapted from Holder, 2001).

The advantages of this medium-term solution according to Holder (2001) are the following:

- The interfaces between the information systems of the SANDF are reduced.

- A reduction in the data redundancy is achieved.

- The system is more simplistic.

It is important to note that the base line requirement of the medium term solution does not change. The new system must still be user friendly. It is believed that the only effective and efficient long-term solution for the unique transactional logistical information systems of the SANDF is to move towards one logistical system for the SANDF to support the GSB concept.

A critical task in the development of integrated logistic information systems is ensuring that end-user requirements are translated into software applications. In other words, ensuring that the end-user gets what he/she wants. The SANDF at the tactical end of the combat service support spectrum requires an integrated system that will provide users with the information they require at the right place at the right time and in the right format. For an integrated system to be truly effective, the business processes of the SANDF must be integrated and standardised from the factory to the foxhole.

Unfortunately, currently this in not the case as explained in Chapter 4. The first step in implementing an integrated single system is the design of standardised strategic logistical processes for the SANDF. The GSB concept will assists in the standardisation of the different procedures in the defence force, leading to the establishment of standardised DOD wide business processes for the SANDF.

The proposed single logistical systems must provide relevant information for decision-making and control purposes to commanders and decision makers at all levels in a format that is understandable to them. The information provided must be useful in the day-to-day operations of support bases, ensuring effective logistical support towards the FSE's. The proposed system can be designed either by combining key elements of the current systems in use into a new system or by acquiring the proposed system.

According to Coetzee (2001), it has been proven in the rest of the world that COTS systems do not satisfy the needs of the military for an integrated logistical management information system. Evidence of this is found in Holland who tried to implement such a system to no avail and at present, they are still encountering numerous problems with the system (Holder, 2001).

Despite this the SITA's official policy is to buy COTS and software. The SITA is not rigid in this policy and amendments to commercial systems will be made to satisfy the needs of the users as stipulated in the information requirements of the SANDF. According to Cumming (2001), they believe that it is the most cost-effective method available to them.

The perception that the current budget of CMI Division cannot afford the implementation of one integrated logistical system since the greatest bulk of the budget is allocated towards the maintenance of current information systems is not entirely true. The effective maintenance and development of three logistical systems are very expensive. According to Coetzee (2001), the current cost of the mainframe can be reduced by an estimated 45% if one integrated logistical systems is implemented in the SANDF. The perception of Coetzee (2001) that the implementation of one system will lead to the reduction in personnel and therefore a reduction in salaries is not credible. Whether the personnel will reduce remains a question that can only be answered in time and with the effective implementation of one integrated system (Van der Merwe, 2001).

Despite these budget considerations, the SANDF will be forced to implement a new single integrated logistical system. The requirements placed upon managers and commanders in the SANDF by the Promotion of Access to Information Act and the PFMA necessitates the need for a single integrated logistical system to support them in decision-making and control. The proposed integrated single unique transactional logistical information system must be relevant to the old systems currently in use. The system must be user friendly; keeping in mind that South Africa is not a first world country. The personnel in the defence force are not all computer literate and training will be needed in this regard.

The need for an integrated system has already been established by laws and regulations placed upon the SANDF by legislation. Because of this the requirements of the SANDF are immense and it is believed that to buy and adapt a COTS system or develop a new systems to satisfy the requirements of the SANDF will be time consuming and very expensive. To remain proficient the SANDF requires a formal method for designing information systems.

5.7 DESIGNING INFORMATION SYSTEMS FOR THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

The proposals to improve the current information management practices as discussed in the previous sections clearly highlight the need for improved information systems for the SANDF to support an integrated forces concept effectively. The continued development of current information systems is no long-term solution to address the inadequacies, because full connectivity and interoperability between the current systems of the SANDF are required. The only effective solution is the total redesign of the current information systems including the logistical systems. This can be achieved by the acquisitions of new systems (COTS) or

by redesigning current systems into new systems to ensure connectivity and interoperability between all systems.

When designing information systems the available information technology in an organisation must be matched with the needs of the prospective users. Organisations usually use either a top down or bottom up strategy approach when matching user needs to technology. The top down approach begins at the top and works its way down through the respective end user types to the lowest levels in the organisation. This top down strategy approach works fine in the power user environment where users are trained in analytic procedures (Russom, 2002: 19).

The bottom up strategy approach starts at lower levels of management and move upward to the top of an organisation. The assumption is made that a reporting platform is appropriate for the users at the base. As the move upwards continues the same reporting platform, fulfil the requirements for more detailed analytical reporting. For this reason, the bottom up approach encompasses more management information end users types and a far greater number of end users than the top down approach. Unfortunately the bottom up approach is time consuming and expensive. The top down approach is normally less time consuming and therefore less expensive (Russom, 2002: 20).

As part of the transformation process, the SANDF implemented the GSB concept. For this concept to be effective management information must be available to lower levels of management with a definite focus on logistical information. Although training is one of the focal points in the line of business of the SANDF, lower level commanders do not always have the knowledge to utilise a complex analytical tool. As these managers progress through the organisation they will be trained to enable them to utilise a complex analytical tool as required by the top down strategy approach. The top down strategy approach therefore will provide inefficient information to lower level managers inside the GSB concept of the SANDF.

In designing information systems, the SANDF must aim at achieving realistic and sustainable results, while containing the costs and complexity of analytics. The SANDF should most probably focus on a hybrid strategy in matching user needs to technology within the constraints of ever decreasing financial resources. The top down strategy and bottom up strategy must be combined to provide usable information for decision making to commanders and managers at all levels in the organisation.

Management information systems and information systems in general must be designed with due regard to the type of decisions, how decision are taken, how the decisions makers relate to the organisation and the nature of the organisation. Acceptance and understanding of this emphasis by both managers and information professionals in the SANDF is the primary prerequisite to effective management information systems design within the DOD

The functional manager and supervisor require more operational data, while senior management needs more strategic information. The time span of control is that time that an individual needs to focus on and for which he or she needs information. The same levels of management exist in the SANDF, but the information requirements at the respective management levels can deviate.

The information needs of the current users and prospective users of information systems must be reflected in the information requirements of an organisation. The movement towards an integrated forces concept with the implementation of the GSB concept in the SANDF resulted in new service requirements and consequently new information requirements. It is clear that effective information system design is based on the requirements of the end users of the systems. All of these requirements must therefore be reflected in the information requirements of the SANDF before any systems design can take place.

Table 5.1 is a guideline that can be used by the SANDF to determine their information requirements. Who should receive what type of information on what level, is illustrated to simplify the process of determining information requirements (Ioma, 2001: 2-3).

After the information requirements for every level of the organisation have been determined, the SANDF must also consider the following rules particularly with respect to information provided to senior management for decision-making purposes when designing information systems (Ioma, 2001: 4-5):

- Keep the information simple.

- Destroy all standard reports currently produced by the systems and implement new reports to satisfy the need of managers as determined.
- Include good and bad news in the reports.

- Provide direction for top management by emphasising where they should focus their attention.

- Do not assume that top management is up to speed with the latest buzzwords in the industry. Outputs generated should be in simple language.

- Prepare managers by educating them on the type of information they will receive from the system to avoid dissatisfaction with the delivered information.

Table 5.1: Information Requirements for Large Organisations According to the Type of Information Required for Decision-making (Adapted from Ioma, 2001: 3).

	Levels of Work	Decision Horizon	Information Required to Manage Work	Appropriate System
Strategic	**CEO** Determine Strategies	10+ years	Second Order Analysis: Are we changing fast enough to achieve the company's strategic objectives?	↓ Metrics and benchmarking reporting (view and analyse historical data using data warehouse via portal)
	General manager Operational Strategy	Up to 3 years	First Order Analysis: Can we meet business plan objectives if we proceed at this rate?	
Tactical	**Functional manager** Manage large groups Design / monitor systems	Up to I year	Consolidation and analysis across systems. Some first order analysis: Are the systems / groups meeting their objectives?	↓ ↑
	Specialist 1st level of management and complex decision making	Up to 3 Months	Consolidation and analysis of operational data in own environment: What have we done? Analysis of simple trends: How have we done? How can we do it better?	Virtual reporting (view and analyse real time data via portal)
Operations	**Supervisor**	Up to 1 month	Observation of basic data concerning own work. How have I done?	↑
	Individual employee	Up 1 Day / week	How have I done it? How can I do better?	

The information requirements and characteristics of the current and prospective users of information play a vital role in the design of information systems. The SANDF must redesign all current information systems in use (not only the logistical systems) to ensure that required DIC are provided to effectively support integrated forces as depicted in the GSB concept of

the SANDF. Numerous problems will be encountered in implementing the proposals to improve information management practices in the SANDF.

5.8 PROBLEMS ENVISAGED WITH THE IMPLEMENTATION OF PROPOSALS TO IMPROVE INFORMATION MANAGEMENT

The transformation process is an ongoing process inside the DOD and therefore the strategy of the Defence Force is not yet finalised. For the same reason comprehensive policy and procedures are not in place to guide management and more specific the management of information inside the SANDF. Because of this, the functional processes that form the basis for the design of an information strategy are not standardised. For the information systems to be standardised the functional processes of the SANDF must be standardised. To be cost effective first rationalise and finish the transformation process before implementing standardised functional processes and resulting integrated information systems.

The achievement of standardised functional processes for the SANDF is therefore only possible after the completion of the transformation processes. The lack of standardised processes will impede information system integration and information system design resulting in difficulties providing the required DIC to support an integrated forces concept effectively.

The personnel of the SANDF are not trained in integrated information systems and thus a lack of knowledge regarding these concepts exists. The status quo is that training in the Defence Force is not generic: The respective Services do their own training. Personnel therefore are only trained to utilise the information systems of the respective service they belong to and training was only done if their mustering required it from them. These inefficient practices resulted in a lack of knowledge regarding the use of information systems and even today, most commanders do not possess the required skills to operate information systems.

The lack of knowledge regarding information technology is the reason why some personnel in the SANDF still regard computers as a threat to their existence in the organisation. The computing culture of the SANDF therefore is very low and the "resistance to change" factors (ICT changes) very high in the organisation. These inefficiencies will ultimately result in difficulties with the implementation of the proposed solutions.

The practice currently is to compare the different information systems in use to emphasise the strong and weak points of each system. The managers of these systems are protecting their systems by not admitting to the weak points of the system as emphasised in the comparison. As previously explained to implement effective DIC the strong and weak points of current systems in use must be integrated into the new proposed DII. Before the design, migration and implementation of the proposed integrated DII can start, this practice must stop.

Constraints regarding high technology systems versus low technology systems exist in the SANDF. A low technology system means more people and jobs involved in the system. On the other hand, the high technology systems will lead to a reduction in the workforce. Decisions regarding constraints like this are made on political motivations and not effective business policies. The implementation of the proposed solutions can be hampered by political decisions resulting ultimately in ineffective systems.

Although many components of the old systems in use can and must be utilised to implement and improve the DII the risk remains that data can be lost with the implementation of the new proposed DII. The incompatibilities in data that exist between the current transactional systems increase the risk even more. The components used by the old systems must be phased out over time to minimise the risk of losing data.

According to Cumming (2001), the operating budget of CMI Division currently amounts to R400 million per year with R360 million per year spent on maintenance and only R40 million per year on planning and development. It is clear that the bulk of the budget is allocated towards maintenance and no funds are currently available for development. The implementation of the proposed solutions will require a hardware update within the SANDF. Unfortunately the current information technology budget of the SANDF cannot afford an upgrade of this nature or the implementation of the proposed solutions.

5.9 CRITICAL SUCCESS FACTORS TO IMPROVE INFORMATION MANAGEMENT INSIDE THE SOUTH AFRICAN NATIONAL DEFENCE FORCE

Information management practices must be approved to support the GSB concept. For the GSB concept to function effectively information for decision-making and control purposes must be provided to managers and commanders at all levels. The PFMA and Promotion of Access to Information Act aim to promote effective governance by fostering a culture of transparency and accountability in the public sector of South Africa.

Managers and commanders on all levels will therefore be accountable for their decision-making processes. If managers and commanders are going to be held accountable, information must be provided to assist them in decision-making and control. The only effective way to provide the required information to managers and commanders is to improve the information management practices of the SANDF. The problems foreseen in implementing the proposals to improve information management have been discussed in the previous section. The critical success factors to improve information management are now addressed and are emphasised by the following:

- Information as a Strategic Asset. Information must be managed as a strategic asset. All DOD members must recognise the importance of information as a key resource and commodity.

- The Standardisation of Business Processes. Business processes must be standardised within the DOD. Information systems are acquired in support of the business and therefore if the same business process were defined differently for each functional environment, it would result in each environment being supported by a unique system.

- Quality information. The information provided by the information capabilities must be of a high standard. Quality can be measured against the accuracy, timeliness, consistency and completeness of the information provided.

- Monitor and review information strategy. The DOD must keep the information strategy under constant review and update it in the light of changing strategic aims and priorities.

- Alignment of information resources between the business and military environment of the DOD. The concept of interoperability and information sharing requires that the information resource requirements between the business and military environments should be aligned to ensure efficient working mechanisms between them.

5.10 SUMMARY

Although information has been classified as a strategic resource by the Public Service Act, Act 103 of 1994, and the Defence Strategies, information is not managed as such in the

DOD. The acceptance of information as a strategic resource is a prerequisite to affect any improvements to information management practices. The effective implementation of the "strategic trilogy of information" should enable the DOD to manage information as a strategic resource and contribute immensely to the acceptance of information as a strategic resource by all managers and commanders in the DOD.

The strategic information concepts of the DOD are defined as the ways by which the ICT in the DII will support the DOD strategic objectives and force employment strategy. The three strategic information concepts accepted by the DOD are the application and information concept, the information access and processing uniformity concept and the dynamic defence communications network.

In fulfilling their mandate the CMI Division provides the required information capabilities to ensure that information is available to the right people, at the right time in an efficient reliable and secure manner, to support decision-making, control and accounting in the DOD. The DIC emanates from the strategic information concepts of the DOD and it constitutes the complete set of information systems required to support the military and business missions of the DOD. The proposed DIC of the DOD comprises the DAP, the DII, the COE and the unique applications and infrastructure in support of non-SDI processes.

For the GSB concept to function effectively managers and commanders on all levels require management information to assist them in planning, decision-making and control. The improvement of information management facilities is essential in adhering to these information requirements placed upon the SANDF by the GSB concept. The way forward is to deliver management information applications on a Web-based technology using the Intranet of the DOD as the delivery mechanism for the information.

The GSB concept can only render effective support if the current logistical systems in use have the ability to communicate with each other. To achieve this the medium term future of the logistical information systems of the SANDF are on distributed platform technology. The only effective and efficient long-term solution for the unique transactional logistical information systems of the SANDF is to move towards one integrated logistical system for the SANDF to support the GSB concept. The single proposed integrated system must provide relevant information for decision-making and control purposes to commanders and managers at all levels in a format that is comprehendable to them.

The proposals to improve the current information management practices highlight the need for improved information systems to support an integrated force concept. The continued development of the current systems in use is no long-term solution. The only effective solution is the redesign of the DII in use by the acquisition of new systems to ensure connectivity and interoperability between all systems.

In designing information systems the SANDF must aim at achieving realistic and sustainable results, while containing the costs and complexity of analytics. This can be achieved by utilising a hybrid strategy in designing information systems. The matching of user needs to available technology capabilities within current financial constraints could be ensured by such a hybrid strategy.

The absence of comprehensive policies and procedures to guide the management of information inside the SANDF could result in problems with the implementation of the proposals to improve information management in the SANDF. Notwithstanding these problems current information management practices must be improved to support the GSB concept effectively and enable the DOD to adhere to legislation.

The management of information as a strategic resource, standardisation of business processes, quality information, the continued monitoring and review of the information strategy and the alignment of information resources between the business and military environments of the DOD are the critical success factors to improve information management inside the SANDF.

CHAPTER 6

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

In Chapter 1 it was mentioned that the purpose of this study is to translate the defined information management practices of the DOD into information management theory that could provide a framework for the implementation of a more efficient information strategy for the SANDF within the GSB concept. Hence, this study explored information management in the DOD and it could contribute to the effective and efficient management of the organisation as a whole.

To achieve this, the study commenced with a fundamental theoretical synopsis of the concepts associated with information management in Chapter 2. Chapter 3 focused on a scientific approach to information management inside the SANDF and in conjunction with Chapter 2 served as the theoretical grounding of the study project. Chapter 4 examined the information management practices currently in use in the SANDF with emphasis on the pre-transformation structure and current structure of the SANDF. In Chapter 5, an overview of proposals to improve information management within the GSB concept of the SANDF was provided.

6.2 SUMMARY OF THE STUDY

The role of information as an organisational resource assumes greater importance for management at all levels because management relies heavily on information to thrive. If information is to be viewed as a resource of comparable importance to personnel, finance and assets, it must be procured and managed as purposefully as any other resource. Organisations derive more value from intellectual than from physical assets; therefore, it is imperative that knowledge (tacit and explicit) is shared amongst the employees of any organisation.

Managers require information to increase their knowledge and reduce uncertainties in decision-making. The value of information is derived from the actions that managers take as a result of using information for planning, decision-making, and controlling. The information required by managers are provided by the information systems of an organisation, more specific, the MIS of an organisation. The reliance on information and information technology

commits an organisation to continual change. Resistance to change and the effective management thereof is recognised as a critically important factor that could influence the success or failure of any organisational change effort.

Information systems are generally expected to provide not only the confrontation between the user and information, but the interaction required for relevant and timely decision-making. Information systems are not seen simply as tools to record transactions and process data, but as assets, which could change the structure and strategy of an organisation. Information systems should support the strategy of an organisation, provide management with relevant information to assist them in problem solving, decision-making, and control.

The main objective of information management is to satisfy the demand for relevant information and thus add value to the organisation. To take advantage of information as a resource a formal method is required for collecting, documenting and validating information. The structure of an organisation can serve as a starting point to establish a formal method for the management of information.

Before transformation in 1997 the SANDF business activities, organisations, and subsequently information systems were primarily identified from a functional perspective, which led to a centralised and power-orientated organisational structure. The SANDF functioned according to these structures with four independent Services (the four vertical silos) that acted independently resulting in limited communication between the Services. The management provision and support of the various resources was viewed as unique because the focus was on the resources, and not the processes required to deal with the resources. This resulted in the development of different logistical support systems within the SANDF.

In support of the different logistical support systems each Service developed its own logistical information system. The result today is more than one logistical system in operation in the SANDF. As information systems naturally follows business activities the current information systems of the SANDF are functionally orientated which makes the sharing of functionality and data troublesome.

The political and constitutional changes in South Africa have brought about a dramatic reversal of past inefficient management practices. These massive changes in South Africa since the first democratic elections in 1994 are also reflected in the DOD. The transformation of the defence function means a change in defence posture, from offensive to defensive. In order to achieve this end, the shape of the DOD and its internal workings has to be changed.

Civil control over the defence function has been one of the most significant changes, which imply the adherence to all legislation passed by parliament.

The DOD therefore operates in an increasingly litigious community and is expected to account for the quality of its decision-making processes. There is a move towards an accountability framework based on compliance with legislation and regulations. An integral part of this framework is the requirement to provide clear and unambiguous evidence of how and why decisions are made. The PFMA and the Promotion of Access to Information Act facilitate this move. If managers and commanders are going to be held more accountable for their actions and decision-making processes, relevant information must be provided to assist them in planning, decision-making and control.

One of the transformation principles of the DOD has been to separate the planning function from the execution function. In adherence to this principle, the SANDF after transformation is restructured into a more integrated forces concept suggesting emphasis on co-operation, joint planning and operations. As part of the transformation of the DOD, it has become apparent that a base structure should be formulated to ensure that the main core business of units (FSE's) would not be hampered by the support function. This function gives rise to the GSB concept to ensure common support to all FSE's. A further consequence should be a reduction in costs and an improvement in logistical effectiveness.

In contrast to the isolation of the past, the Services now form part of a larger defence community, which necessitates a new approach to management. Before transformation management, activities were identified from a functional perspective implying that the activities of the SANDF focussed on the object of the process opposed to the process itself. After transformation the SANDF adopted a process approach to management, which necessitates full connectivity and interoperability between the different information systems of the organisation.

In striving to fulfil its constitutional mandate the DOD is intending to utilise its resources as effectively and efficiently as possible. To achieve this the availability and access to the right information at the right time is critical for managers and commanders operating in an environment of co-operation, joint planning, and operations. To obtain essential information for planning, decision-making, and control, information must be sourced from, processed, and communicated across all system boundaries.

To cater for the inadequacies of the current information systems of the SANDF, information integration could only be achieved with complexity. This complexity does not really resolve the problem, because special skills and capabilities are constantly required to obtain the required information. As the demand for integrated information increases, the inadequacies of current systems will become more apparent. The standardisation of business processes and functional processes of an organisation is a prerequisite for information systems integration and standardisation. The functional orientation and centralised structure of the SANDF before transformation resulted in the development of separate business and functional processes for each Service tailored around their respective needs.

Only an integrated information management environment can adhere to the information requirements of an integrated force concept like the GSB concept. An integrated environment can be achieved by the acquisition of an ERP product or by combining self-developed systems into a custom build ERP system. The available architecture of the information systems in the SANDF is inadequate in its present state to support an integrated process approach as the focus in the past was on transactional operating systems. Improvements to the current information systems and information management practices are required to support a joint engagement strategy and assist managers and commanders to adhere to legislation and regulations applicable to them.

The acceptance of information as a strategic resource is a prerequisite to affect improvements to information management practices. Although the DOD has classified information as a strategic resource, information is not managed as such. The effective implementation of the "strategic trilogy of information" should enable the DOD to manage information as a strategic resource. The three accepted strategic information concepts define the "way" by which the ICT in the DII will support the strategic objectives and force employment strategy of the DOD.

Command Management Information Division should provide the required information capabilities to ensure that the required information for accounting and decision-making is available at the right time, to the right people in an efficient reliable and secure manner. The DIC emanates from the strategic information concepts of the DOD and it constitutes the complete set of information systems required to support the activities of the DOD. The improvement of the information management facilities is essential in adhering to the additional information requirements for planning, decision-making and control placed upon the information facilities of the SANDF by the GSB concept.

The Intranet of the DOD should act as the delivery mechanism for management information using a Web-based technology to deliver the management information to the current and prospective users. The GSB concept can only deliver effective support if the current logistical information systems in use have the ability to communicate with each other. The medium term future of the logistical information systems in the SANDF lies therefore on distributed platform technology, but the only effective and efficient long-term solution is to move towards one integrated logistical system to support the GSB concept.

The required DIC highlight the need for improved information systems to support an integrated force concept. The only effective solution is the redesign of the DII to ensure connectivity and interoperability between all information systems. The continued development of the current information systems in use is no solution. The user requirements (needs) could be matched to available technology within current financial constraints by utilising a hybrid strategy in designing information systems. Regardless of the problems envisaged with the implementation of the proposals to improve information management in the SANDF, information management practices should also be improved for the GSB concept to function in an efficient and effective manner.

6.3 RESEARCH CONCLUSIONS

The challenge for the public sector in the ever-evolving knowledge economy is to be able to effectively respond not just to economic developments but more importantly to the sweeping social and cultural shifts associated with it. These requirements are already visible in the DOD with the movement towards a framework of transparency in decision-making and control resulting in increased accountability and responsibility of managers and commanders at all levels. With the introduction of the PFMA and the Promotion of Access to Information Act, the ability to adhere to the requirements of accountability and responsibility has become a necessity.

This study indicated that relevant and timely information for decision-making and control purposes should be provided to managers and commanders to assist them in sound decision-making and control. From the research it is clear that in its present state the available architecture of the information systems of the SANDF is inadequate to provide the required information. The information management practices, including the information systems of the SANDF, require improvement to ensure adherence to the requirements of accountability and responsibility. Therefore, it is concluded that the cost of the information

structure required for a joint engagement strategy should not exceed the cost saving achieved with the implementation of the strategy.

As part of the transformation process, the DOD decided to follow a process approach towards organisational restructuring by moving away from the functional orientated business processes (functional silos) of the past. The present structure is a more flat organisational structure emphasising co-operation, joint planning and joint decision-making. In compliance with this high-level business processes were established and approved by parliament as depicted in the value chain of the DOD but the institutionalisation of the business processes did not take place. Consequently, the mapping of the business processes to the organisation is not formalised and therefore not available for use in information system design.

The process approach towards information system design requires a set of core business processes for all business areas. The conceptualisation and institutionalisation of business processes for all business areas in the SANDF are therefore required. The functional orientation that still exists within the DOD impedes the development of business processes. For this reason it can be concluded that the information requirements of the SANDF are still based on a functional perspective and to enable a process approach to information systems design a comprehensive understanding of information flows inside the DOD and the information requirements of the DOD are required.

Because integrated business processes were not available for use in information system design current information systems in use are functional orientated making it nearly impossible to support an integrated force concept effectively. The only way to provide consistent information support throughout the SANDF is with integrated information systems. The functional orientation that exists impedes the integration of current information capabilities. From the research it is clear that for the GSB concept to function effectively the current logistical information systems in use must have the ability to communicate with each other on at least stock management level. The only effective long-term solution is therefore to move towards one integrated logistical information system to support the GSB concept. A single logistical information system (to facilitate logistical support) is required for the GSB concept to reduce the cost of logistical support and to provide a high quality service to all FSE's.

The SANDF should strive to achieve the highest possible level of information management maturity across the organisation to ensure efficient information management practices. Unfortunately, the inefficient information management practices of the past resulted in the

existence of diverse information management maturity levels across the Services of the SANDF. This phenomenon can be explained by the fact that information are not currently managed as a resource of strategic importance although the DOD recognise information as a strategic resource.

The development of application and information standards is essential to guide acquisitions and maintenance decisions to ensure contextualised integrated architecture in the DOD. Priority focus areas must be identified for application development against the background of holistic enterprise architecture to ensure effective utilisation of limited resources. In the establishment of architecture, the development of a COE that is shared by the processes of the DOD must have precedence over specialised high cost capabilities. It is of critical importance that the content and boundaries of the COE are defined before changes to current architectures are made.

From the research it can be concluded that an investment in information technology alone is not enough to ensure improved information management practices. A special component within any organisational initiative is the human component, which is vital to the success of the initiative. Associated with the implementation of any initiative is resistance to change, which is an essential factor to be considered in any change process, since the proper management thereof is the key to success or failure. Without analysing the cultural consequences of the initiative, the implementation thereof is likely to fail. The successful implementation of new information capabilities requires an appropriate level of computing culture. Attempting to implement sophisticated information capabilities into organisations that have not developed the computing culture to match the implementation will inimitably reduce the possibility of success. This translates into the readiness of the SANDF for the implementation of new information capabilities - a positive computing culture.

By employing quality measures throughout the implementation process and by paying particular attention to the training of personnel the risk of implementation can be reduced. Even the best systems will fail if employees cannot use it properly and efficiently. Training will reduce the gap between the present situation (body of knowledge) and the skills required utilising the proposed information capabilities effectively. Pre-implementation training will establish skills that users require using the new implemented capabilities and dealing with exceptional conditions while post-implementation training will focus on using the systems efficiently.

One of the spin-offs of efficient and effective information management practices is the ability to comply with the Promotion of Access to Information Act. The Act will be a burden to organisations that do not have comprehensive and effective information management. At the same time, the PFMA require new reporting requirements for the preparation of financial statements. To adhere to these principles of financial management as required by the PFMA accrual accounting principles is a necessity. From the research, it can be concluded that the current unique legacy financial management system based on cash accounting principles does not provide in all the requirements for accrual accounting practices.

Furthermore, to satisfy the requirement of accrual accounting, an accounting system is required that is integrated with the rest of the business. Typically, the implementation of these systems will acquire a significant investment in time and money. A decision therefore to purchase an accounting software package has ramifications that extents well beyond the current finance function. For effective and efficient information management practices the SANDF should look beyond pure transaction processing ability to additional functionality that adds value to all the functions of the organisation.

Enterprise Resource Planning vendors are able to provide this functionality as they integrate management information applications. In providing an integrated information environment, the SANDF can acquire an ERP product or combine one or two packages and some essential self-developed systems into what might be seen as a custom ERP system. The selection of a single ERP product or the combination of one or two packages and some essential self-developed systems is a strategic one that needs serious evaluation due to the size of the investment and the future ramifications for all aspects of the organisations business.

One of the strategic objectives of the SANDF is the assurance of quality command and management information. From the research it can be concluded that failure to improve the information management practices of the SANDF will result in the non-achievement of this strategic objective and ultimately the ineffective execution of the Defence Strategies.

6.4 RESEARCH RECOMMENDATIONS

It is recommended that the DOD conduct a comprehensive information audit to determine the current information capabilities and information requirements of the organisation. A successful information audit will discover exactly what and where the information resources of the SANDF are, who uses them and who does not, why, at what cost and with what

results. Consequently, the information needs that are not adequately catered for within the present information capabilities will be identified and a comprehensive understanding of the information flows inside the DOD will be achieved. Only now can business process owners be appointed to direct the conceptualisation and institutionalisation of core business processes for all business areas in the DOD. The use of Business Process Re-engineering disciplines to analyse and relate the core business processes to strategic objectives and performance measures are also recommended.

The systems engineering approach should migrate from a functional base (silo) approach to a process based (modular) approach to ensure connectivity and interoperability between the information systems of the DOD. To achieve a process approach towards integrated systems design, information should be centrally managed in the DOD to ensure contextual architecture integration. The determination of the level of information management maturity of each Service is recommended to ensure that the Services lagging behind in maturity are identified and transformed to the required level. The use of a hybrid strategy in matching user needs to technology and the institution of Enterprise Architecture Planning (EAP) is also recommended to assist in the development of application and information standards to guide acquisitions and maintenance decisions. The use of EAP must be DOD wide to enable configuration management from a systems based approach.

People need to understand why change is happening and this can only be effectively achieved by the implementation of change management programmes aimed at all levels of the SANDF. The use of pre- and post-implementation training is recommended to implement the proposed solutions and to achieve an understanding and acceptance of the change by all the employees of the organisation. For this reason it is recommended that the computing culture of the SANDF should be determined before any changes to information management practices are implemented to ensure that the SANDF are ready for the implementation of new information capabilities.

Given the complexity of the selection of an ERP product and its implications for the SANDF, the DOD should undertake a formal package selection process before any product is acquired. The integration of the strong and weak points of current information systems in use, into the selection process is also necessary. Because system managers deny any weak points, independent research to determine the true abilities of current systems should be conducted. A formal package selection process should first determine the business requirements and then evaluate these requirements against the various packages available

in the market before any systems upgrade takes place to provide the proposed information capabilities as indicated by the information requirements of the SANDF.

Financial constraints placed upon the SANDF due to continued budget cuts are a reality. The limited available financial resources will restrict the technological sophistication of the information capabilities of the SANDF. For this reason, available funds should be allocated to those capability development efforts that demonstrate the highest value contribution to the DOD mission success. Therefore, any investment in information systems must enhance efficiency, effectiveness, functional capabilities, and low cost.

Command Management Information Division is the enabler in ensuring the availability of required information to support command and management decisions and accounting in the DOD. The current budget of CMI Division cannot provide for the implementation of the proposed solutions. A reallocation of resources is recommended to make funds available for the implementation of the solutions to ensure that information is managed from a position of strength and harnessed for maximum organisational gain. This can only be achieved by changing the budget priorities for the SANDF in this regard. To ensure the availability of funds to affect the implementation of the proposed solutions, a higher priority must be put on information technology and information systems across all organisational boundaries. It is further recommended that the additional information requirements placed upon the DII of the DOD within a joint operating environment (GSB concept) be financed by the cost savings achieved from the improvement in logistical effectiveness resulting from the GSB concept.

In conclusion, it is recommended that information should be managed as a strategic resource in the DOD to ensure that information is managed in such a way that the strategic potential of the resource is fully realised to the benefit of the organisation as a whole. This can only be achieved by attaching the same importance to the resource information as to any other resource of the DOD. The achievement of this will lead to the improvement of information for decision-making and control resulting in more efficient and effective decision making inside the SANDF.

6.5 FURTHER RESEARCH

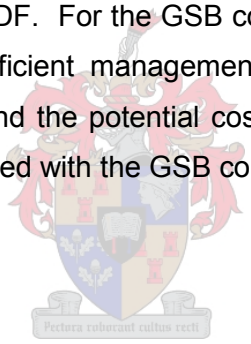
The research concluded that cost savings are present within the implementation of the GSB concept because of a decrease in resources required in the logistical support system of the SANDF. Further research to determine the extend of the cost saving already achieved with

the implementation of the GSB concept and the potential cost savings still to be achieved with the concept needs to be done.

The research further recommended that the SANDF should acquire an ERP package to support the activities of the organisation from the foxhole to the business end of activities. To achieve sufficient support, the ERP package should provide the required information to ensure the effective and efficient functioning of the GSB concept. An investigation needs to be done to determine the benefits and disadvantages of possible ERP packages for the SANDF. Some of the packages to be investigated are SAP, JD Edwards, Oracle, and Peoplesoft.

6.6 SUMMARY

The GSB concept per definition implies co-operation, joint planning and joint operations. This joint operating environment places additional information requirements on the DII (information systems) of the SANDF. For the GSB concept to be an economical system and to contribute to effective and efficient management, the cost savings achieved with the implementation of this concept and the potential cost savings should finance the additional information requirements associated with the GSB concept.



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